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## THE NONSPECIFIC CHARACTER OF VACCINE THERAPY *


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Wright's conception of the value of vaccine therapy was based on the accuracy of the opsonic index. When later the opsonic index was shown to be an unreliable guide, and since the immunologists had no better method for determining immune body formation, it was necessary in case vaccine therapy was to be continued that the clinician draw his own conclusions regarding the value of this method of treatment. Interpretation of results passed now from the hands of the laboratory worker to the clinician.

The application of any therapeutic measure to this group of diseases is fraught with considerable difficulties. Spontaneous recovery is the rule; the duration and intensity of the infection is so variable that it is extremely difficult to draw accurate conclusions regarding the value of any special line of treatment. In order to justify statements regarding curative agents, a large number of carefully selected controls must be studied, and then only when the difference in results are striking should we be justified in concluding that the course of the disease had been modified.

Typhoid fever is the only acute infection, treated with vaccines, in which a large series of cases with suitable controls has been reported. A study, however, of the accumulated statistics of typhoid does not lead to the conclusion that vaccines when given subcutaneously have materially modified the course of the infection. We are disappointed when we search the literature for beneficial results from vaccine therapy in colon bacilli infection, acute or chronic rheumatism, bacillary dysentery, whooping cough, gonococcal infections, and dermatologic conditions, such as acne and furunculosis. Furthermore, a review of the literature fails to reveal any striking evidence that vaccines when given subcutaneously have definitely modified the course of any acute infection; much less has it been demonstrated that the results were due to the specific character of the vaccines. It has only been in the last two years that extensive comparative studies have been made regarding the value of specific and nonspecific vaccine therapy. As a result of these studies it now appears possible to draw conclusions on this point.

It may be said that the first well defined and unquestionable results obtained by vaccine therapy were those[1] recently obtained by Ichikawa and independently by Kraus and Mazza,[2] and Penna in the treatment of typhoid by the intravenous use of typhoid vaccine. Kraus used a polyvalent vaccine of ether-killed organisms and Ichikawa a sensitized vaccine. These investigators, by giving a dosage of from 200 to 300 million, were able to terminate, usually after a single injection, about 20 per cent. of their cases by crisis. About 20 per cent. more terminated by rapid lysis, the temperature reaching normal in from three to five days. An additional 20 per cent. showed a favorable modification in the temperature curve with apparent but not striking shortening of the course of the disease. The remaining 40 per cent., with the exception of the temporary drop in temperature following the chill which occurs after the injection, were not affected by the treatment. Occasionally when a single injection failed to give results, definite improvement may follow a second injection. Rarely, however, if two injections fail to give results is there likely to be improvement after further treatment.

Ichikawa and Kraus very early determined that the reaction was not specific, as the former discovered that the typhoid vaccine worked equally well in paratyphoid, and the latter that similar good results could be obtained in typhoid with a colon vaccine, the important factor being that the vaccine be given intravenously. This intravenous vaccine in typhoid not only marked the beginning of striking results from vaccines, but also raised the question of the specificity of the reaction. Much earlier than this, however, the literature contained considerable evidence that the reaction was certainly not entirely specific in character.

In 1893, Fraenkel[3] treated fifty-seven typhoid patients with subcutaneous injections of killed typhoid bacilli. He reported that the course of the disease was favorably modified and in a few cases terminated by rapid lysis.

Rumpf,[4] an associate of Fraenkel's, repeated the treatment in another series, using, however, the *Bacillus pyocyaneus* with equally favorable outcome. While Rumpf's results were disputed, in the light of recent observations they were probably correct.

Von Wagner[5] in 1909, having observed that patients with general paresis frequently showed marked temporary improvement after a course of fever, treated a number of patients by exciting a febrile reaction with tuberculin. He employed large doses, 0.5 c.c., every second day until from seven to twelve injections had

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1. Ichikawa: Abortive Treatment of Typhoid and Paratyphoid, Sei-i-Kwai Med. Jour., 1913, **33,** 73.

2. Kraus and Mazza: Zur Frage der Vakzinetherapie des Typhus abdominalis, München. med. Wchnschr., 1914, **61,** 1967.

3. Fraenkel: Ueber Spezifische Behandlung des Abdominal Typhus, Deutsch. med. Wchnschr., 1893, **19,** 958.

4. Rumpf: Die Behandlung des Typhus abdominalis mit Abgetöteten Kulturen des Bacillus Pyocyaneus, Deutsch. med. Wchnschr., 1893, **19,** 561.

5. Von Wagner: Ueber die Behandlung der progressive Paralyse, Wien. med. Wchnschr., 1909, **59,** 2125.

been given, and reported definite temporary improvement, which he considered too constant to be accounted for by the spontaneous improvement often noted in this disease.

Vaughan,[6] several years ago in his studies on immunity, observed that it was possible to produce in animals a transitory immunity to the colon bacillus by using peptone or egg albumin, and that this immunity was apparently equal to that following immunization with colon bacilli. He also noted that animals immunized to the *Bacillus subtilis* and *Bacillus prodigiosus* possessed a certain degree of immunity to typhoid and cholera.

Schmidt,[7] in 1910, called attention to the increased resistance of the body to a variety of common infections following any form of vaccine therapy.

Herescu and Shoninger,[8] in 1913, in their efforts to show the close morphologic relation between the gonococcus and meningococcus, reported favorable results in gonorrheal complications, as arthritis and ophthalmia, from the use of meningococcus serum.

Returning to the observations that have been made on the nonspecific character of vaccines since Kraus' work in 1914, it will be seen that in the short period of three years there has developed an extensive literature. Lüdke,[9] after verifying Kraus' results with colon vaccine, experimented in typhoid with a 4 per cent. solution of deutero-albumose given intravenously. He obtained results which compared favorably with those obtained with typhoid vaccine. This marked a step in advance, showing that not only were the vaccines not specific but also that similar results could be obtained by using a foreign protein of nonbacterial origin. More recently, Saxl[10] has successfully treated typhoid by using intramuscular injections of sterilized milk. Mittlander[11] has treated 300 cases of typhoid by the intravenous injection of 1 c.c. of 20 per cent. caffein and 10 per cent. camphor. He does not state how these drugs were given, but presumably intravenously, as within fifteen minutes the patients had a chill with marked temperature elevations. He reports frequent termination by lysis or crisis. The chill reported may have been due to impure physiologic sodium chlorid solution, but more likely to the caffein and camphor. There is considerable evidence to show that not only foreign protein but also other agents that will excite a chill may bring about a sudden immunity. Janeway[12] refers to the rapid termination by lysis of typhoid in a patient in whom a chill followed a transfusion for hemorrhage.

Various foreign proteins are now being used in this country in the treatment of a variety of acute infections, largely owing to the stimulating work of Jobling and Petersen,[13] chiefly typhoid vaccine and proteose. In Germany, sterilized milk and sodium nucleinate are chiefly used. Next to typhoid the condition which has received the greatest attention has been the arthritides. For this condition, Müller and Thanner[14] and Schmidt[15] have used intramuscular injections of sterilized milk; Smith[16] and Luthlein,[17] normal horse serum; Culver,[18] colon meningococcus and gonococcus vaccines; Müller and Weiss,[19] tuberculin. Colloidal substances, like collargol,[20] have also been used successfully; Lusk[21] and I have treated 130 cases of arthritis, using chiefly typhoid vaccine, results of which will be detailed later.

A less extensive series of a variety of other infections have been reported. Kraus treated eight patients with puerperal sepsis with colon vaccine, and reports beneficial results in seven. Ziembowski[22] has injected milk with good results in sepsis and tuberculosis, especially of the bones. Schmidt has treated typhus, Müller and Thanner conjunctivitis and iritis, and Friedlander[23] trachoma with milk. Engman and McGarry[24] have used typhoid vaccine successfully in lupus and psoriasis. This probably explains the good results obtained in psoriasis with autoserums, as after coagulation the serum becomes a foreign protein. Strouse and Frank[25] have treated hay-fever with staphylococcus vaccine, and report results equal to those obtained by the use of pollen.

Our observations have been confined chiefly to the application of foreign protein therapy to the acute, subacute and chronic arthritides. During the past year and a half we have treated at the Cook County Hospital 175 cases. This included streptococcus and neisserian types. In our first series of twenty-five, the patients after entering the hospital were kept at rest in bed for a few days before receiving any treatment in order to determine what benefit might be derived from this procedure alone. We have used typhoid vaccine almost exclusively as a foreign protein, and in a few cases, proteose and chicken serum; the latter two were used in a sufficient number of cases to show that the results are apparently the same as with the typhoid vaccine. The vaccine at first was prepared from Rawling's strain, but later from a culture obtained from a virulent typhoid. Commercial vaccines are unreliable on account of the variable amount required to give the desired reaction. With the freshly prepared vaccine the dosage has ranged from 40 to 150 million. When beginning the use of a fresh supply of vaccine, its toxicity was determined by beginning with a small dose of 40 million and then increasing until the amount required to give the desired reaction was ascertained. This precaution is advisable, as the toxicity of the vaccine may be quite variable. With few exceptions the vaccine has been given intravenously. Following

6. Vaughan, V. C.: Protein Split Products in Relation to Immunity and Disease, 1913.
7. Schmidt, R.: Med. Klin., 1910, No. 43.
8. Herescu, P.: Ueber die Behandlung der lokalen und allgemeinen Komplikationen der Gonorrhea durch Antimeningokokken Seruminjektion, Verhandl. d. deutsch. Gesellsch. f. Urol., 1913, **4**, 102.
9. Ludke: Behandlung abdominal Typhus mit intravenösen Injektionen von Albumosen, München. med. Wchnschr., 1915, **62**, 321.
10. Saxl, P.: Ueber die Einwirkung pyrogenes Substanzen und Fieber, abstr., München. med. Wchnschr., 1916, **63**, 571.
11. Mitlander: Budapest Letter, THE JOURNAL A. M. A., April 22, 1916, p. 1320.
12. Janeway, T. C.: Tr. Cong. Am. Phys. and Surg., 1916, **10**, 142.
13. Jobling, J. W., and Petersen, William: The Nonspecific Factors in the Treatment of Disease, THE JOURNAL A. M. A., June 3, 1916, p. 1753.
14. Müller and Thanner: Ueber parenterale Eiweiss Injektion, Med. Klin., 1916, **12**, 1120.
15. Schmidt, R.: Ueber Proteinkörpertherapie und über parenterale Zufuhr von Milch, Med. Klin., 1916, **12**, 171.
16. Smith, L.: Value of Anaphylaxis in the Treatment of Gonorrheal Complications, THE JOURNAL A. M. A., June 3, 1916, p. 1758.
17. Luthlein, F.: Zur Kenntnis der Wirkung der Vakzens, Wien. klin. Wchnschr., 1916, **29**, 253.
18. Culver: Verhandl. d. deutsch. Gesellsch. f. Urol., 1913, **4**, 102; THE JOURNAL A. M. A., Feb. 3, 1917, p. 362.
19. Müller, R., and Weiss, A.: Fieber Behandlung gonorrheische Komplikationen, Wien. klin. Wchnschr., 1916, **28**, 249.
20. Wick: Behandlung des Gelenkrheumatismus mit Einspritzung von Kollargol ins Blut, München. med. Wchnschr., 1916, **63**, 350.
21. Miller, J. L., and Lusk, F. B.: Use of Foreign Protein in the Treatment of Arthritis, THE JOURNAL A. M. A., June 3, 1916, p. 1756; Dec. 30, 1916, p. 2010.
22. Ziembowski, D.: Ueber den therapeutischen Wert parenteraler Milch Zufuhr, Med. Klin., 1916, **12**, 1174.
23. Friedlander: Therapeutische Erfahrungen bei parenteraler Injektion von Protein Körpern und ihren Spaltzproduction in die Augenheilkunde, Wien. klin. Wchnschr., 1916, **29**, 1321.
24. Engman, M. F., and McGarry, R. A.: Treatment of Certain Diseases of the Skin by Intravenous Injection with Foreign Protein, THE JOURNAL A. M. A., Dec. 9, 1916, p. 1741.
25. Strouse, S., and Frank, I.: Pollen Extracts and Vaccines in Hay-Fever, THE JOURNAL A. M. A., March 4, 1916, p. 712.

the injection the patient within a few minutes to one hour has a chill, usually quite severe, with marked rise in temperature, 104 to 105 F.

Rarely does the rise in temperature persist for more than a few hours, although in one instance a high fever persisted for two days. In several cases a second chill has occurred from six to twelve hours after the injection. The patient suffers only the inconvenience that would come from a rise in temperature of this degree. At times there is nausea and severe headache, the former transient, the latter rarely persisting more than twenty-four hours. Not infrequently an extensive herpes may develop after the typhoid, colon or gonococcus vaccine, and with somewhat greater frequency after a meningococcus vaccine. In acute arthritis it is not unusual to note a most remarkable improvement in the joint symptom by the time the patient is through sweating. Immediately after the injection there is usually a slight leukocytosis which, during the chill, drops to normal or much below. We have observed a leukopenia reaching 1,800 per cubic millimeter in one instance following a violent reaction. The leukopenia is due to a reduction in the polymorphonuclear cells. This period of leukopenia is brief and possibly does not always occur, although we have never failed to detect it when counts were made at frequent intervals. It is followed by a rapidly developing leukocytosis of the polymorphonuclear type, which reached its maximum in four to twelve hours, gradually returning to normal in from twenty-four to forty-eight hours. This leukocytosis may reach 100,000 or more, but as a rule runs from 15,000 to 20,000. We have never observed a marked eosinophilia, as has been noted in anaphylactic reactions, nor have we seen any evidence of bronchial spasm, which is a constant accompaniment of severe anaphylactic shock. The blood pressure at the time of the chill is usually moderately elevated, on the average to from 10 to 15 points, although in one instance a rise of 40 mm. was noted. This rise in pressure is probably due to muscular contractions. Immediately after the chill there is a rapid and decided drop, reaching its maximum about six hours after the injection and then gradually returning to normal. A fall of 40 mm. is not uncommon. Systolic and diastolic pressure are about equally depressed, so that the pulse pressure remains the same at all periods of the reaction. When patients have received repeated injections, not infrequently the reaction after such successive injection becomes less marked.

That such violent reactions are not free from danger must be apparent. In our service at the Cook County Hospital we have treated 200 patients without any grave consequences with the exception of one case, an acute arthritis in an alcoholic, who following the injection developed delirium tremens and died about fifty-two hours after the injection. In three other patients, all alcoholics, marked delirium developed soon after the injection, in one instance continuing for thirty hours. Dyspnea and cyanosis were noted in a few cases. The urine never showed more than a transitory albuminuria. This absence of unfavorable consequences was probably due to certain precautions acquired by experience. Each new supply of vaccine was carefully tested out in order to determine a safe dosage. Patients with hypertension, marked valvular lesions or myocardial changes were not injected. When the infection was very acute, as shown by the temperature, the dosage of vaccine was reduced. After our experience with the delirium tremens patient, marked alcoholics were not treated.

The literature contains reports of several fatalities, all apparently in typhoid patients. Sladek and Kotlowski[26] report one, and Eggerth[27] one—both from intestinal hemorrhage. Biedl[28] reports two deaths in typhoid from uncontrollable epistaxis. Föchler[29] noted an epileptiform convulsion after the intravenous injection of an immune serum for gonorrhea in a gonorrheal case, and Arnold and Hölzel[30] observed acute dilatation of the heart, with recovery after the use of the same agent. Weichart[31] calls attention to the development of a proteinogenous cachexia in animals after the prolonged use of foreign protein.

We have quite complete records of ninety-three cases of acute arthritis treated by intravenous foreign protein, with few exceptions in the form of typhoid vaccine. Of this series, eighty patients were either relieved of their pain and soreness or greatly benefited by from one to four injections given daily. Six showed only moderate improvement, and seven were not benefited, although receiving repeated treatments, in two cases eleven and thirteen injections, respectively. In the majority of these there was no marked recurrence. However, mild recurrences after apparent recovery are common, this taking place within twenty-four hours to ten days or more. One patient with acute arthritis had six severe recurrences, although each time he was entirely relieved of pain and soreness after a single injection. It would appear that these recurrences are due to reinfection of the joints, as not infrequently they appeared in joints not previously involved. Apparently the effect of the treatment is confined to the infection in the joint, the primary focus escaping. When an acute endocarditis was present as a complication, this was apparently unmodified by the treatment. However, those who have treated gonorrheal arthritis report definite improvement in the urethral discharge, prostatitis, epididymitis, etc. In one case with a complicating iritis, this disappeared after a single injection. Müller and Weiss call attention to the difficulty of completely clearing up a gonorrheal infection by this method of treatment, as even in the midst of the treatment new complications may arise. In order to determine whether repeated daily injections, continued for from four to six days, would lessen the frequency of recurrences, a number of patients in spite of the marked improvement following a single injection were given daily or every second day, further injections until a total of from four to six had been given. Recurrences were noted less frequently when the treatment was given in this manner, but could not by any means be entirely avoided. Kinsella[32] has shown that the sterilization of the blood in streptococcus endocarditis, after a chill excited by transfusion with defibrinated blood or impure salt solution, was of short duration, namely, twenty-four hours. Evidently in his cases the primary source of the blood infection was not eradi-

26. Sladek and Kotlowski: Zur Vakzine Therapie des Typhus abdominalis, Wien. klin. Wchnschr., 1915, **28,** 389.
27. Eggerth: Ueber die Behandlung des Typhus abdominalis mit Typhus Vakzine, Wien. klin. Wchnschr., 1915, **28,** 209.
28. Biedl, A.: Therapeutische Verwendung von Typhus Impfstoffen beim Menschen, Prag. med. Wchnschr., 1915, **40,** 53.
29. Föckler: Zur Vakzinebehandlung der Gonorrhea, Dermat. Wchnschr., 1912, **55,** 1395.
30. Arnold, A., and Hölzel, H.: Ueber den Wert intravenöser Arthigonin Injektionen bei Gonorrhoischen Prozessen, München. med. Wchnschr., 1914, **61,** 1967.
31. Weichart, W.: Beiträge zur Proteinkörpertherapie, Wien. klin. Wchnschr., 1916, **29,** 1611.
32. Kinsella, R. A.: Bacteriologic Studies in Subacute Streptococcus Endocarditis, Arch. Int. Med., March, 1917, **19,** 367.

cated. One of our patients with a subacute arthritis had been little benefited by foreign protein injection and had also proved resistant to salicylates. This patient developed a lobar pneumonia during which his arthritis permanently disappeared. Another patient with a gonorrheal arthritis had been treated with proteoses, typhoid and gonorrheal vaccine, with but little benefit. In the hospital he developed a tonsillar abscess, with temperature of 102 F., and within a few days the arthritis had disappeared. The behavior of the acute arthritides to foreign protein is not unlike that of profuse sweats observed after large doses of salicylate, as after either of these means marked amelioration of symptoms may be observed. Frequently, however, in spite of continuance of the treatment, recurrences will take place, or, in case the treatment is discontinued, acute joint soreness soon redevelops.

Thirty-three of our acute arthritides patients had been under active salicylate treatment, before receiving the foreign protein, without benefit. All but four of these were promptly, at least temporarily, greatly benefited by the typhoid vaccine.

Eighteen patients with subacute arthritis received the treatment. Fourteen of these were definitely benefited. Recurrences here were common, but in conjunction with the protein, an effort was made to clear up any foci of infection. Four weeks after the treatment several of these patients had not suffered from a relapse.

Twenty-eight patients with chronic arthritis received the treatment. Only those were treated in whom there was definite evidence of acute recurrence of the infection. Definite temporary improvement was quite frequently observed, and in a few cases, one of two years' duration, the patients received such benefit that they were able to return to work. The results on the whole were sufficiently suggestive to warrant a continuance of the treatment in selected cases.

The chief difficulty in this form of therapy is the violence of the reaction. An important question is the relation of this reaction to the beneficial action of the foreign protein. It has been our experience that when an injection was not followed by a chill, although there might be a marked leukocytosis, no definite beneficial results have been observed. Very large doses of protein intramuscularly also failed to produce the definite immediate results observed after the intravenous use. This does not exclude, however, the possibility that the disease was modified or that in case the injections had been continued for a period of time improvement may have resulted. Others have reported the same experience. Müller and Weiss report that in gonorrheal complications the proprietary immune serum for gonorrhea used by Fochler, when given in doses of 0.1 c.c. intravenously, will bring about marked amelioration of symptoms, while 0.5 c.c. intramuscularly has little if any effect. The German observers who have used milk intramuscularly report good results with moderate reaction. The reaction, however, is much more marked than that observed when vaccines in large doses are given in the same manner. Müller and Weiss, after the intramuscular injection of milk, report a temperature of from 103 to 104 F. Friedlander, who used this treatment in trachoma, reports that he did not observe a temperature above 101 F. and in many patients in whom good results were obtained, the temperature was only a little above normal. It is, however, the consensus of opinion that marked temperature reactions are associated with good results. The various observers have all laid stress on this point and many consider the fever as the essential factor in the curative action. The Germans are now referring to this method of treatment as febrile therapy, believing that any agent that will cause a rise in temperature may give results.

The nature of the reaction responsible for this suddenly developing immunity has not been determined and it may be due solely to the temperature reaction and the various agencies of immunity excited by it. It is too early to state whether or not this method of treatment will become a permanent therapeutic measure. The results so far obtained would make it appear that it cannot be entirely discarded.

The chief objection to its continuance is the danger of grave or fatal reaction. Its careless administration must be carefully guarded against. This form of therapy must be considered as still in the experimental stage, and should not be generally applied without first a careful consideration of the dangers associated with it. If used, the toxicity of the particular vaccine must be determined, and the patient carefully examined especially for cardiovascular pathologic conditions. Failure to observe proper precaution may place this treatment in unwarranted disrepute. If the results now observed could be obtained without the violent febrile reaction, it would seem that this method of treating acute arthritis is superior to salicylate or other means at present employed.

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## ABSTRACT OF DISCUSSION

DR. JACOB DINER, New York: I do not quite understand whether the essayist refers to intravenous vaccine therapy or vaccine therapy at large. These are two different factors. In relation to the intravenous method we are justified in speaking of nonspecificity. I can understand the nonspecificity of vaccines intravenously, but when given otherwise we are confronted with a different proposition and I do not doubt that here different proteins will bring about different results. No doubt vaccines have a better field in prophylaxis and in chronic diseases than in the acute diseases. I should like to ask whether Dr. Miller refers to stock or autogenous vaccines in arthritis, and if autogenous, from what source he obtains the organism? The dose of vaccines is also important. The majority of physicians go by the label on the package. The importance of graded doses in the individual case cannot be too much emphasized.

DR. JOHN F. ANDERSON, New Brunswick, N. J.: I should like to ask if Dr. Miller uses protein such as egg white, or the protein prepared from some of the cereals.

DR. ABRAHAM G. SHORTLE, Albuquerque, N. M.: I should like to ask if Dr. Miller has had any anaphylactic reaction on two, three or four doses. As the first gentleman said, it would seem to me that the use of vaccines in the skin and intravenously are two different matters. In using vaccines intradermally for a number of years I have been convinced that there is a certain specific action in the mixed infections of tuberculosis. It is not as satisfactory as we wish, but in observing numerous cases there is a certain percentage in which we find the sputum and temperature decrease and the mixed germs decrease, and I think there is some truth in the statement attributed to Dr. J. B. Murphy, "that no one ever dies of tuberculosis." I take it that he meant that they die of secondary infections. We feel that vaccines have done good in a certain proportion of the mixed infections, though as in all treatments for tuberculosis the good is not nearly so marked as we would like.

DR. RUSSELL L. CECIL, New York: During the past winter I treated about forty patients with acute arthritis in the wards at Bellevue Hospital with intravenous injections of vaccines. In thirty-three cases of acute arthritis I think probably 90

per cent. were cases of rheumatic fever. The others were cases of toxic arthritis. There were seven cases of gonorrheal arthritis. The vaccine used was typhoid vaccine, except in the gonorrheal cases, in which I used the New York Board of Health gonococcus vaccine. I found that the latter, just as the former, produced a chill and rise of temperature. Of the thirty-three cases of acute arthritis which were not gonorrheal I think thirteen patients recovered completely without any help from salicylates. In the other cases of acute arthritis we felt it was necessary to supplement the vaccine treatment with salicylates. Nearly all of the patients were improved by the vaccines but they showed a tendency to relapse. Many patients were relieved of their joint symptoms but complained of pain in the back and neck, and we gave salicylates to relieve this. All the gonorrheal patients were treated with gonococcus vaccine except two who received typhoid vaccine. They all improved slowly, without any apparent influence from the vaccine.

DR. TORALD SOLLMANN, Cleveland: I should like to emphasize a point which has been made in a way, but which may be overlooked; namely, that the term "vaccine therapy" is apt to be misleading. Apparently we are not dealing with immunity reactions, but with a pharmacologic reaction, the use of the vaccine being merely a method of producing this reaction. It will be interesting to learn whether similar reactions and similar cures cannot be secured by nonprotein pyretic agents. The change in the disorder occurs as a response to the abnormal temperature, and is distinct from an ordinary vaccine reaction.

DR. FRED I. LACKENBACH, San Francisco: I would take advantage of Dr. Miller's paper to clear up confusion in the previous discussion in regard to the antipneumococcic serum. It appears that certain groups of pneumococci will not be influenced by serum prepared from other groups. For instance, a pneumococcus infection caused by Group III will not be influenced by antipneumococcus serum which represents only Group I. This serum is an animal fluid; it is a blood serum and not a vaccine. One must determine the type of pneumococcus and then obtain the proper serum. The whole subject of specific and nonspecific immunization is extremely perplexing.

DR. WALTON F. DUTTON, Tulsa, Okla.: Just so sure as we have a prophylactic vaccine for typhoid, the time is not far distant when we will be able to isolate the particular strain which causes typhoid in a patient. Rarely are two cases of typhoid alike, and we know that at all times they are caused by different strains of bacteria. The cure of typhoid by use of autogenous vaccines is not far off. It is just as nearly possible to cure typhoid by the use of the specific protein as by the nonspecific.

DR. R. G. TORREY, Philadelphia: Has Dr. Miller any data regarding the influence of these injections on the development of cardiac disease? In acute rheumatism the joint involvement is negligible as regards danger of permanent change, and the question of particular interest, although the point about which we hear little, is the question of cardiac damage. Last summer, with my residents, Drs. Francis and House, I treated a series of twenty-nine patients with acute and chronic arthritis, either by injections of bacterial preparations, or the intravenous injection of formaldehyd solution, which gives a similar constitutional reaction. In the acute cases the effect on the arthritis and acute symptoms was favorable beyond our expectations, but we have not yet been able to draw any conclusions as to the influence of this mode of treatment on the development of disease of the heart.

DR. CLEON W. SYMONDS, New York: I should like to ask if Dr. Miller does not think that the results he gets from these vaccines are not due entirely to the temperature produced by the reaction as in the tonsillitis and pneumonia cases to which he referred? Also whether he desires to get a high reaction and whether his results are in proportion to the amount of elevation of temperature he gets with the injections?

DR. W. W. TOMPKINS, Charleston, W. Va.: I should like to ask if in these cases of arthritis Dr. Miller permits his patients to be up and around? A man may have arthritis of the elbow or wrist and in a sense can be comfortable, whereas if he had a corresponding degree of arthritis in the ankle or knee he would almost be compelled for his own comfort to go to bed. The question has been asked in regard to the relative degree of the cases which are complicated with heart disease. Does it not devolve on the physician to see and emphasize and insist on these patients going to bed, thereby protecting themselves?

DR. W. A. WOMER, New Castle, Pa.: I should like to relate our experience with the use of vaccines with respect to the nonspecificity or use of them in pneumonia, typhoid fever and arthritis. We find the various strains of vaccines vary as to the effect on the patient, and it does not make any difference in regard to the temperature, as some with high temperatures have poor results, and some with low temperatures, good results. I have tried streptococcus, pyocyaneus, colon and staphylococcus, etc., and find some of the vaccines useless, while others will produce a reaction.

DR. JOSEPH L. MILLER, Chicago: In regard to the question whether vaccine given intracutaneously might act differently than when given intravenously, this may be true, but we consider it only a difference in the rapidity of absorption. We have tried to see whether we can bring about good results by large doses of vaccines intramuscularly and are still working on it. It is true that German investigators are using milk intramuscularly with good results, and in studying their records we find they report benefit in patients with mild reactions. The general opinion is, however, that a good reaction is essential. There is evidence in the literature regarding the nonspecificity of vaccine when used subcutaneously. Fraenkel, in 1903, used large doses of killed typhoid bacilli in treating a series of typhoid fever patients and reported good results, one or two of his cases terminating by crisis. His assistant repeated this test on other series, using *Bacillus pyocyaneus* and reported clinically good results. The question of the reaction, which Dr. Sollmann has mentioned, is interesting. I believe the term "protein therapy" is not correct. The Germans use the term "febrile therapy" for anything which produces a rise in temperature may accomplish the same purpose. Mention was made by one speaker as to getting results where the reaction was mild. Our experience has been that a good reaction is essential in order to obtain striking results. As to vegetable protein, we used a pollen protein in some cases of arthritis but there was a great deal of difficulty in getting the right dosage in order to bring about a chill; but when we obtained it we got the same result as with any other protein. Along the line of this is the work of Frank and Strauss who treated hay-fever with staphylococcus vaccine and reported results which compared favorably with those obtained with pollen vaccine. Anaphylactic reactions we have never observed. Regarding the symptoms, we have never observed anything that might not occur with the initial chill of any acute infection, and the dangers observed, provided precautions are taken in regard to dosage, are no greater. I do not think that the patient with severe arthritis is especially uncomfortable during the chill, and on questioning them they do not complain of pain in their joints as a result of the shaking. We have been unable to determine whether this mode of treatment lessens the frequency of endocarditis. In patients who have an endocarditis with arthritis we have never seen any results on the endocarditis.

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**Card Rating System for Food Handlers.**—In Portland, Ore., the board of health has adopted a system of rating stores handling food products of any kind, with reference to the sanitary condition of such stores. A store whose sanitary condition, according to the inspection of the health board, averages 90 per cent. or better is given and is required to display a card showing that its rating is "A." Shops averaging only up to 80 per cent. are required to display a "B" card, and those rating under 80 per cent. a "C." The card must be displayed so that every patron may see it, and the regulation is enforced by frequent inspections. As might be expected a noticeable improvement has been made in all shops, each merchant being anxious to get an "A" rating. An advertising point is made by the merchant of a good rating, and customers profit by improved sanitary conditions.

# ARTHRITIS AND FOREIGN PROTEIN

## CHRONIC RHEUMATISM RELIEVED BY INTRAVENOUS INJECTIONS *

HENRY BASCOM THOMAS, M.D.
CHICAGO

Patients with chronic arthritis present a more vital problem in economy to the tax payers of the city and county and to the private hospital than almost any other cases. Their relative number for admission is large, and their stay is usually very long. There were 161 acute and 160 chronic arthritic patients in the County Hospital last year. St. Luke's does not admit chronic cases as a rule, yet many arthritic patients constantly receive careful and prolonged care there. Finally, many of these patients must go to the county or state poorhouses or homes for incurables when they have worn out their welcome in the city institutions.

In the spring of 1916, several patients with chronic arthritis appeared on my service at the County Hospital. They gave a history of treatment by "shots into the vein of something which made them chill and relieved their pain." They proved to be some of the first patients with intravenous injections of typhoid vaccine by Miller and Lusk,[1] whose first article on this new treatment appeared in June, 1916.

Anything which held promise of relief for chronic rheumatism was extremely attractive, and when advocated by experienced men, seemed worthy of an immediate trial.

A government strain of typhoid vaccine made by Dr. Moody at the laboratories of St. Luke's Hospital was used in the cases which form the bases of this report.

It seems to be fairly well established that typhoid vaccine in arthritis does not relieve symptoms by forming antibodies, that it is not a specific therapeutic agent, but that the benefit is derived from the protein carried in the dead bodies of the bacteria which are thought to produce a rise of temperature and hyperleukocytosis, just as other proteins like milk, proteose, horse serum, chicken serum, and sodium nucleinate are thought to do.

In March, 1916, Müller and Weiss,[2] using the vaccine treatment in cases of gonorrheal arthritis, advanced the view that the beneficial effects produced by the vaccine therapy are due to the induced fever, or at least that the fever is a weighty component in these effects, and that the favorable effects are not due, or not mainly due, to the development of specific antibodies. They also state that the therapeutic effects seem to be greater the higher the degree of induced fever, and this is confirmed in my experience. See the case of H. S. below.

Jobling and Petersen,[3] in speaking of the nonspecific factors in the treatment of disease, say:

> It seems probable that the fundamental change on which the majority of [these] biologic reactions are based is one of colloidal dispersion, in that the injections bring about a less dispersed state affecting not only the serum proteins but also the serum lipoids. Such an alteration is sufficient to account for the fluctuations in the ferment-antiferment balance, and in the coagulation mechanism, as well as in the opsonic and complement powers of the serum, although it does not at present explain the increased antibody titer. With this as a basis we can understand that so many and diverse substances can bring about a reaction almost identical clinically and therapeutically. But here, as in so many other biologic problems which have to do with that most complex of tissues, the blood, it seems probable that no single factor can be identified as responsible for all the changes which occur, but that a whole train of events is inaugurated when the equilibrium of some of the delicate serum balances is disturbed, all of which tend toward a condition favorable for recovery from infection.

TABLE 1.—DATA IN TWENTY CASES

| Patient | Age | State | Nationality | Occupation | Examining-Room Diagnosis |
|---|---|---|---|---|---|
| M. S. | 39 | Widow | U. S. A. | Laundress | Arthritis of hip |
| J. D. | 42 | Widow | U. S. A. | Nurse | Multiple arthritis |
| J. S. | 54 | Widow | Irish | Housework | Hallux valgus and arthritis |
| L. Z. | 56 | Married | German | Housework | Arthritis deformans |
| M. C. | 42 | Widow | Lithuanian | Janitress | Chronic osteoarthritis |
| E. C. | 55 | Widow | U. S. A. | Housework | Chronic arthritis |
| E. S. | 28 | Single | U. S. A. | Clerk | Multiple arthritis |
| G. E. | 22 | Single | U. S. A. | College | Multiple arthritis |
| M. C. | 29 | Married | German | Clerk | Multiple arthritis |
| A. P. | 44 | Married | Hungarian | Laborer | Chronic arthritis |
| F. S. | 53 | Married | German | Laborer | Osteoarthritis |
| A. R. | 36 | Single | Russian | Laborer | Pes planus; chronic arthritis |
| C. H. | 54 | Married | Swedish | Laborer | Hallux valgus; arthritis |
| H. G. | 32 | Married | German | Laborer | Osteoarthritis |
| I. O. | 42 | Married | Austrian | ..... | Arthritis deformans |
| H. W. (colored) | 32 | Married | U. S. A. | Laborer | Gonorrheal spurs; flat foot |
| R. T. (colored) | 18 | Single | U. S. A. | Domestic | Arthritis |
| H. R. | 23 | Married | Russian | Factory | Arthritis |
| A. A. | 54 | Married | Italian | Laborer | Gonorrheal arthritis |
| G. L. | 49 | Single | Norwegian | Iron-Molder | Flat feet; arthritis |

A large percentage of the patients under discussion had subacute and chronic cases, with beginning and advanced joint changes — hard working, ill fed and poorly cared for persons who sought the hospital as a last resort.

Table 1, of twenty cases of the series, gives an idea of the average age, nationality, occupation, civil state and examining-room diagnosis.

Rest in bed and a search for and elimination of the focus of infection is made a prerequisite to the injections in all cases, save in those in which the patients need the immediate relief from suffering which the vaccine gives. These have the treatment at once. If a sufficient interval has elapsed since the last meal, say six or seven hours, the gastro-intestinal reaction is less severe, and the patient less uncomfortable.

* From the Orthopedic Clinics of St. Luke's Hospital and the County Hospital.

* Read before the Section on Orthopedic Surgery at the Sixty-Eighth Annual Session of the American Medical Association, New York, June, 1917.

1. Miller, J. L., and Lusk, F. B.: The Treatment of Arthritis by the Intravenous Injection of Foreign Protein, THE JOURNAL A. M. A., June 3, 1916, p. 1752.

2. Müller, R., and Weiss, A.: Fieberbehandlung Gonorrhoischer Komplikationen, Wien. klin. Wchnschr., 1916, **29**, 249.

3. Jobling, J. W., and Petersen, William: The Nonspecific Factors in the Treatment of Disease, THE JOURNAL A. M. A., June 3, 1916, p. 1753.

In seeking the cause of the arthritis, the following possible sites of infection were kept in mind; tonsils, teeth, gums, sinuses, ears, eyes, urethra, prostate, gall-bladder, heart, gastro-intestinal tract, organs of female pelvis, etc.

In a few of the cases there was no demonstrable focus. In one patient who had a most severe multiple ostearthritis affecting practically all joints, and who killed himself by taking poison, an exceedingly careful postmortem, in which particular attention was given to the urethra and prostate, revealed no cause for the crippling joint condition. Many other cases which I am in the habit of calling clean because the patients present at a glance a favorable hygienic condition — white, clean teeth and pink, hard gums — present no clue which enables us to find a focus of infection. My experience causes me to raise the question whether an obscure infected gland cannot do as much damage as a bad tonsil or an ulcerated tooth.

In subacute and chronic cases of ostearthritis one will make no mistake if he prescribes 50 million typhoid vaccine intravenously, and in those cases which react only moderately cautiously raises the amount at intervals of two or three days to 75 million bacteria at an injection.

In eighty-six subacute and chronic cases treated, I have not yet seen harm done or alarming symptoms result from this treatment. Indirectly, several fatal cases have come to my attention, but they were, in my opinion, acute cases with alarming coexisting illness, and therefore should not be used as arguments against the free use of the vaccine in the general run of subacute and chronic cases coming to the attention of the orthopedist. Moderately advanced heart and kidney disease and tuberculosis of the lungs have not been considered sufficient reason for withholding the protein, but these diseases have been looked on as demanding carefulness in (*a*) the preparation of the patient, particular care being taken that the stomach is empty for several hours before the injection; and (*b*) the administration of a small initial dose, this to be increased gradually, but only after all the disagreeable symptoms of the former injection have disappeared and the appetite has returned.

TABLE 2.—PROTOCOL OF CASE 1

| 6-29-16, 7:30, 75 million Leukocyte Count | Temperature | Pulse | Respiration |
|---|---|---|---|
| Before injection, 13,600 | 98 | 76 | 20 |
| Four hours later, 13,950 | 97.2 | 64 | 20 |
| Twenty-four hours later, 13,800 | 97.4 | 60 | 20 |
| No reaction to injection. | | | |
| 7-6-16, 4:30, 75 million Leukocyte count: | Temperature | Pulse | Respiration |
| Before injection, 14,200 | 98.8 | 76 | 20 |
| Three hours later, 12,000 | 101.2 | 112 | 22 |
| Sixteen hours later, 20,000 | 99 | 80 | 20 |
| Eighteen hours later, 12,200 | 98 | 76 | 18 |

## RESULTS OF THE VACCINE

These may best be described under three heads: (1) the immediate effect; (2) the early relief from pain, and (3) the end-results of the treatment.

1. *Immediate Effect.*—This is an uncomfortable feeling which ranges from slight to very severe, accompanied by a chill, rise of temperature and emesis. The marked reaction is usually not so evident in the chronic as in the acute cases. The gastro-intestinal symptoms are less marked in cases of equal chronicity in which food has been withheld for four or six hours before the injection. The temperature charts in old cases frequently show a higher fever following the second and third injection.

CASE 1.—H. R., who showed no reaction to first injection, reacted to second with temperature of 101.2 and leukocytes 20,000. Dates of injections, leukocytes, temperature, pulse and respiration are shown in Table 2.

There was headache and nausea in two hours. Emesis in two hours, forty minutes. Severe headache in twenty-eight hours.

CASE 2.—H. S. was injected for the first time July 25, 1916, at noon. The temperature rose to 104.4 F.; at the second injection it reached 106 F. Cyanosis developed. This represents the most severe reaction among my patients. Unfortunately the blood counts were not taken. Part of the record is given in Table 3.

TABLE 3.—PROTOCOL OF CASE 2

| | Temperature | Pulse | Respiration |
|---|---|---|---|
| 75 million at noon | 99 | 92 | 18 |
| Pain in feet and head 11:03 | .2 | 120 | 24 |
| Pain in feet and head 2 p. m. | 104 | 120 | 24 |
| Severe headache at 3 p. m. | 104.4 | 124 | 22 |
| Feels better at 6 p. m. | 103 | 120 | 22 |
| Head and feet pain at 8 p. m. | 104.4 | 120 | 28 |
| Injection 7-27-16: 1 p. m.; 75 million | 99.4 | 100 | 26 |
| Chill, cyanosis, nausea, emesis at 2 p.m. | 105 | 100 | 26 |
| Headache 3:30 p. m. | 106 | 140 | 28 |
| Discharged 8-30-16. Recovery. | | | |

2. *Early Relief from Pain.*—The practically complete relief from all joint pains and the optimism of the patient a few hours after the vaccine are most striking and pleasing factors in virtually all these cases. The patients feel cured. They are encouraged and hopeful. Following an interval of two days the pain usually reappears, but this interval decreases with the number of injections. After from twelve to twenty-four treatments over a period of from one to two months, these patients are in most cases able to leave the hospital as cured. Attention is, of course, given to any operative need the case may present, such as heel-spurs, and to proper balance.

3. *End-Results of the Treatment.*—These are not as satisfactory in my cases as Miller and Lusk report in their papers. The relief of pain has not been permanent in more than 30 per cent. of the patients treated. The remaining cases, however, have done much better than previously treated cases, and I consider this method superior to others I have used. The marked alleviation of symptoms and small percentage of dangerous results must eventually force it into more general use.

30 North Michigan Avenue.

## ABSTRACT OF DISCUSSION

DR. WALTER G. STERN, Cleveland: The injection of a large amount of foreign protein into the blood stream is, of course, not without danger; but anything that promises relief in this (always intractable) class of cases is worthy of discussion. I have had no experience in the treatment of gonorrheal arthritis with typhoid vaccines, yet I cannot conceive how the typhoid vaccine protein would be superior to the gonorrheal vaccine protein, especially that of the strain used for the complement fixation test. Gonorrheal vaccine used subcutaneously never succeeded in curing acute gonorrheal arthritis, but it may be that the intravenous exhibition would be more efficacious. The clinical results from the use of foreign protein in chronic hypertrophic arthritis may be divided into three distinct stages: (1) the stage of damage from the injection of foreign protein, as shown by increased rigors, nausea, rise of temperature, and a higher leukocyte count; (2) the stage of improvement in symptoms, familiar to all of us who have tried to treat arthritis by any means; we have all in the past used injections of the thymus and other glands of internal secretion, and in almost all instances the patients say that they are better, and they are better for the time being; (3) but then comes the sad third stage of relapse, and in my experience in the use of typhoid vaccines

the third stage here is the same as in the use of injections of the organs of internal secretion. Some patients do well with injections of thymus, and then relapse, and it is the same with injections of pituitary gland. I am sorry to have to confess that in all my cases but one, the third stage after the typhoid vaccine injections was the same as the third stage after injections of any of the organs of internal secretion. The successes of Drs. Thomas and Miller with the typhoid protein are, however, so striking that I feel the proposed treatment is worthy of an extended trial.

DR. R. O. MEISENBACH, Buffalo: I should like to ask Dr. Thomas whether the patients that he has been treating had been having an elevation of temperature over a long period —say two months.

DR. HENRY B. THOMAS, Chicago: It is not a question of the kind of vaccine; dead bodies of bacilli, some kind of foreign protein, put into the circulatory system will cause the reaction. There is no advantage claimed for the typhoid vaccine over the gonorrheal or other vaccines containing foreign protein. With regard to the temperature, some of the subacute cases ran a moderate temperature, but most of them did not show as much temperature as the acute cases.

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# THE RÔLE OF HEPATIC TISSUES IN THE ACUTE ANAPHYLACTIC SHOCK*

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The anaphylactic reaction is undoubtedly a reaction in which all tissues and all organs of the body take part. The clinical picture is presumably a physiologic balance between various anaphylactic and antianaphylactic mechanisms. The clinical control of anaphylaxis, as well as the ultimate development of anaphylactic theory, would necessitate an understanding of the nature of the reaction in each of the physiologically important tissues. The present investigation is an attempt to determine the nature of the reaction in hepatic tissues.

## MATERIAL AND TECHNIC

The livers of normal and anaphylactic guinea-pigs were repeatedly perfused with dilute foreign protein, either in Locke's solution or in defibrinated normal or anaphylactic blood. The resulting changes in the toxicity of the perfusion fluid were estimated by subsequent tests with isolated anaphylactic lungs.[1]

In making the pulmonary test, the ductus arteriosus is ligated, and a citrated cannula is tied into the pulmonary artery, delivering the perfusion fluid under constant pressure and temperature. After passing through the pulmonary blood vessels, the fluid is allowed to escape from the open left auricle. During the perfusion, the lungs are alternately expanded and allowed to collapse by air forced into the tracheal cannula, in a manner simulating the normal respiratory movements. Note is made of the resulting changes in resistance to inflation, and in the promptness and completeness of the expirating collapse.

*Normal Lungs.*—If normal guinea-pig lungs are thus perfused with Locke's solution or 50 per cent. defibrinated normal guinea-pig blood containing even as high as 20 M. L. D.[2] foreign protein, no distinct changes in the pulmonary elasticity are produced. The lungs are readily inflated, and collapse promptly, and completely, till the end of the test (seven to ten minutes).

*Anaphylactic Lungs.*—If anaphylactic guinea-pig lungs are similarly tested with from 0.5 to 1 M. L. D. foreign protein in Locke's solution or in 50 per cent. defibrinated normal blood, the lungs are invariably thrown into a typical anaphylactic response. After a latent period of from twenty to forty-five seconds, a slight resistance to inflation is usually observed, together with a slight slowness and incompleteness of the expiratory collapse. The reaction progresses rapidly and usually ends in a complete pulmonary fixation or immobilization by the end of from seventy-five seconds to two minutes. At the end of the reaction, the lungs are of a liver-like consistency. They can neither be further dilated nor collapsed by changes of air-pressure in the tracheal cannula.

## 1. NORMAL LIVER

If the liver of a normal guinea-pig is repeatedly perfused with 0.5 to 1 M. L. D. foreign protein, either in Locke's solution or in 50 per cent. normal or anaphylactic blood, no distinct change in the toxicity of the perfusion fluid is observed on subsequent tests with isolated anaphylactic lungs. Slight increases or decreases in the length of the latent period are sometimes noted; but in no case is the latent period shortened or prolonged more than a few seconds. There is never a loss of the promptness or completeness of the subsequent pulmonary fixation.[3]

The normal guinea-pig liver, therefore, has no appreciably detoxicating, or antianaphylactic, action on foreign protein, either tested alone or mixed with normal or anaphylactic blood.

## 2. ANAPHYLACTIC LIVER

If the liver of an anaphylactic guinea-pig is similarly perfused with from 0.5 to 1 M. L. D. foreign protein in 50 per cent. anaphylactic blood, the perfusion fluid usually loses completely or almost completely its power to produce an anaphylactic response in subsequent tests with anaphylactic lungs. While control tests with unperfused protein mixtures may give complete pulmonary fixation within seventy-five seconds, anaphylactic lungs tested with the perfused mixture usually remain elastic and fully collapsible, till the end of the test (from seven to ten minutes).

The anaphylactic guinea-pig liver, therefore, has a marked detoxicating, or antianaphylactic, action on a specific foreign protein blood mixture.

*Mechanism.*—If the anaphylactic liver is repeatedly perfused with from 0.5 to 1 M. L. D. foreign protein in Locke's solution, no reduction in the toxicity of the perfusion fluid is observed on subsequent tests with anaphylactic lungs.

The detoxicating action of the anaphylactic liver is, therefore, not due to a direct action of the hepatic tissues on the foreign protein.

If the anaphylactic liver is repeatedly perfused with from 0.5 to 1 M. L. D. foreign protein in 50 per cent.

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* Read before the Section on Pathology and Physiology at the Sixty-Eighth Annual Session of the American Medical Association, New York, June, 1917.

1. W. H. Manwaring, and Yoshio Kusama (Jour. Immunol., 1917, **2**, 157) give a sketch of perfusion apparatus.

2. M. L. D.=minimal fatal intravenous dose for a sensitized guinea-pig.

3. W. H. Manwaring and Harold E. Crowe (Jour. Immunol., 1917, **3**) give data.

normal blood, a reduction in toxicity invariably takes place. The reduction, however, is only occasionally sufficient to prevent completely the anaphylactic response in subsequent tests with anaphylactic lungs. It is never as complete as in perfusions with anaphylactic blood mixtures.

The detoxicating action of the anaphylactic liver is, therefore due to a functional cooperation between the sensitized fixed hepatic cells and certain circulating normal and anaphylactic blood elements.

*Chemical Changes.*—Parallel precipitin titrations of perfusion fluids, before and after repeated passage through the anaphylactic liver show that there is no appreciable change in the amount of the foreign protein in the perfusion fluid as a result of the liver perfusions.[4]

The loss of the toxicity of the perfusion fluid is, therefore, not due to a removal or destruction of the foreign protein by the fixed hepatic cells.

On repeated passage through the anaphylactic liver, the perfusion fluid not only loses its power to produce the anaphylactic pulmonary reaction, but acquires a new power, that of causing an unusual relaxation or loss of tone in the pulmonary tissues. The lungs tested with the perfused fluid collapse more promptly and completely than normal. The edges of the lobes curl over, giving a wilted or flabby appearance on expiration. There is also a loss of the occasional power of the perfusion fluid to cause vasoconstriction.

The detoxicating action of the anaphylactic liver is, therefore, accompanied by and may possibly be due to an explosive formation or liberation of vasodilator and bronchodilator substances by the liver.

This finding is in harmony with analyses of the anaphylactic reaction in the dog.[5] The pronounced fall of blood pressure, which is the essential feature of the acute anaphylactic shock in the dog, is not due to a direct action of the foreign protein on the sensitized blood vessels, but is an indirect phenomenon, due to the explosive formation or liberation of vasodilator substances by the liver.

### CONCLUSIONS

The agreement between the foregoing findings would suggest that the explosive formation or liberation of vasodilator and bronchodilator substances by the sensitized liver is an essential feature of the acute anaphylactic reaction in all animals.

The demonstration of a functional cooperation between the sensitized hepatic cells and certain circulating blood elements, in the detoxication of foreign proteins, calls attention to the possibility of similar cooperations being operative in other antitoxic actions.

## ABSTRACT OF DISCUSSION

DR. A. A. EGGSTEIN, Nashville, Tenn.: Will the foreign protein anaphylactic blood mixture, after having been perfused through the lung, cause the immobility of lungs of other sensitized guinea-pigs, or is the liver the chief organ in the detoxicating effect on the mixture? Will anaphylatoxin, proteoses, and other toxic proteins have an immobilizing effect on the lung of a normal guinea-pig?

DR. W. L. MCFARLAND, New York: If my memory is not false I think that something along similar lines was said, so far as the liver is concerned, at a meeting before the Serologic Society several years ago. So far as the action of the liver in anaphylaxis is concerned, I have had no personal experience; but in connection with immunity and the formation of antibodies, at the Institute in Copenhagen six or seven years ago we injected a number of rabbits and goats in branches of the mesenteric vein for the production of agglutinin and found that there was practically no difference in the amount produced or in the rapidity of the production. By that method the liver seemed to have no influence.

DR. W. H. MANWARING, Stanford University, Calif.: There are a number of observations in the literature that point to the liver as having a marked detoxicating function in the acute anaphylactic reaction. Our studies have shown that this antianaphylactic action is not merely an expression of normal hepatic functions, but is largely due to a new, acquired liver function, developed as a result of the process of protein sensitization. To what extent the other tissues of the body share in this antianaphylactic function is a phase of the problem on which we are at present working.

Tests with protein split products give inconclusive results, due to the fact that such a large variety of foreign substances is capable of causing reactions in the isolated guinea-pig lungs.

4. W. H. Manwaring, Yoshio Kusama and Harold E. Crowe (Jour. Immunol., 1917, **3**) give data.

5. Manwaring, W. H.: Ztschr. f. Immunitätsforsch. u. exper. Therap., 1910, **8**, 2. The dogs here studied were adult street dogs, sensitized by a single subcutaneous injection with from 5 c.c. to 25 c.c. horse serum; kept in outdoor kennels, at winter temperature (London), and tested at the end of from fifteen to thirty days. It is, of course, possible that additional factors may be operative in more highly sensitized young dogs or puppies.

# FAMILIAL HEAD NYSTAGMUS IN FOUR GENERATIONS ASSOCIATED WITH OCULAR NYSTAGMUS *

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PHILADELPHIA

Combined nystagmus of the head and eyes, persisting during life and reappearing in consecutive generations, must be exceedingly rare, since we seldom find mention of this disorder.

The family reported in this article is of Russian Jewish nationality, and at least four generations of the family have shown the affliction, members of three of which I have examined. The features of these cases are the persistence of the associated nystagmus in the stock and throughout the lives of the individual members, together with certain other nervous manifestations, notably, stammering. Both sexes had the combined nystagmus and both transmitted it to their children.

### FIRST GENERATION

From the fact that two brothers exhibited the condition, it is possible that other instances of nystagmus preceded them. Concerning one brother, we have no additional information. The other died at 86 years, and notwithstanding his disease is said to have had good vision. His descendants I have traced.

### SECOND GENERATION

There were eight children, three sons and five daughters. Most of them died in early life, and I have been unable to gather any clinical data respecting them. One daughter who had nystagmus lived to be 80 years old. Another daughter did not have the disorder, although she transmitted it to her two sons, and it is interesting to note that these children were by different husbands. This Russian peasant woman came to America when she was 60 years old. She is still

* From the Department of Neurology, University of Pennsylvania, School of Medicine.

* Read before the Section on Nervous and Mental Diseases at the Sixty-Eighth Annual Session of the American Medical Association, New York, June, 1917.

active although now 78, and has given me the details regarding the family history.

THIRD GENERATION

It is in this period that the afflicted persons became available for study. Of three children, the daughter is normal and has no family, while the two sons, who are half brothers, exhibit the combined nystagmus. The elder patient, aged 48, is distinctly neuropathic; as a child he stammered badly, and eight years ago he had an attack of facial paralysis. He has been nystagmic from infancy, but during adult life the manifestations have been less apparent. The patient is not conscious of the head shaking, although the phenomenon often recurs several times a day. Suddenly, and usually during moments of abstraction, the head undergoes a series of horizontal, coordinated movements, consisting of five or six oscillations, of considerable amplitude and with an approximate frequency of twenty per minute.

No opportunity has been afforded to observe the eyes at the time of the head movements. The irises are brown. The ocular tremor has seldom been spontaneous since childhood, but it may be brought out by any extreme movement of the eyes. The oscillations are horizontal, the range is greatest when looking toward the left, and the speed, though irregular, is about 160 per minute. He has eight children who shall be referred to later.

The younger brother, aged 40, has exhibited nystagmus of the eyes from birth and of the head for the past five years. He is a tailor, enjoys excellent health, and has good personal habits except for incessant smoking. He is slightly dwarfish, his neck and thorax being disproportionately short. Though not subjectively aware of his head movements, he has been told that they occur many times a day. When looking in a mirror and with his attention directed toward the phenomenon, it is never manifested. The oscillations, which appear in series, are usually made up of ten or twelve individual movements; they are always horizontal, and impress the observer as a repeated sign of negation. While of less amplitude, the individual movements are more rapid, and the series recurs with greater frequency than do those of his half-brother. The speed is about 120 per minute.

Although he labors long hours at exacting work, he has not yet worn glasses. The irises are brown. An almost constant unsteadiness of the eyes is seen, and this is intensified by all extreme ocular movements; but the direction is invariably horizontal. The rate of movement is about 200 per minute.

His head nystagmus, though embarrassing, is not without its humorous side, and in childhood afforded much amusement to the schoolchildren. A customer entered his tailor shop to order clothes, and just then the dissent spasm occurred. The customer in surprise asked, "You do not wish to sell me again?" On another occasion, a collector called and, observing the persisting sign of negation, exclaimed, "You say no! You won't pay?"

FOURTH GENERATION

In the family of the younger brother there are two sons and one daughter. The older son, aged 16, shows no stigmata and has the mental alertness not uncommon to the Jewish race. The other children, who are twins, are undersized, rather delicate, and the boy is of slightly lowered mentality. The sister, aged 10, alone shows nystagmus of the head and eyes; the manifestations in the eyes date from birth, and those of the head began a few months later. The head movements are not so uniformly horizontal as are those of her father and half-uncle. Her eye movements, which are horizontal, are irregular both in time and in amplitude; this ocular nystagmus is usually present, and has a speed at times of as much as 200 per minute.

In the family of the elder brother there are eight children, three of whom stammer the same as their father; but one appears to have acquired the habit through imitation. Another child, a daughter, also stammered during the period of a nervous breakdown of several weeks' duration. None of the children show spontaneous nystagmus of the head or eyes, but in one daughter extreme excursion of the eyes in any direction causes a horizontal nystagmus.

THE NATURE OF NYSTAGMUS

The term "nystagmus" is here extended beyond its usual application. Literally, it means to nod; and we observe in ophthalmology that the "nod" may be in different directions, giving us the various forms of nystagmus.

Nystagmus may be said to be involuntary, coordinated and rhythmical movements, of frequent occurrence and resulting from alternate contractions in opposing muscles. The term appears equally applicable to certain head movements, and occasionally it has been so used.

In describing nystagmus, Gowers[1] cites an interesting case; he writes:

> Very rarely there is a slight movement of the head, corresponding to that of the eyes in direction, or in the opposite direction of that of the eyes. In a case lately under my care, with symptoms of cerebellar tumor and cerebellar nystagmus, the pharynx and the larynx were the seat of similar movement; that of the pharynx as horizontal, toward the median line; in the larynx there was a similar lateral movement of the arytenoid cartilages. The rate of movement was the same as in the ocular muscles, 180 per minute.

Nystagmus extending beyond the eyeballs was described by Popper,[2] and still later by Pick, who designated the condition accompanying the eye nystagmus as lid nystagmus. The latter was obtained with both the lateral and vertical movements of the eyeballs. It exceeded the ocular nystagmus when the patient looked to the right or to the left. Even head nystagmus was observed by Popper in a case of multiple sclerosis. The phenomenon of lid nystagmus as explained by Pick was that of diffusion of the disturbance causing ocular nystagmus, to the nucleus of the levator palpebrae superioris.

Conjugate deviation of the eyes is reported by Sklodowski[3] as a new sign occurring with apoplexy. These peculiar movements lasted for more than forty-eight hours preceding death in a hemiplegic patient. The movements were lateral, continuous, slow and rhythmical, and at the rate of about sixteen per minute.

After death an area of softening was found in the right lower parietal lobe, the posterior portion of the second temporal convolution and in the adjacent part of the occipital lobe. The explanation offered by Sklodowski is that irritation of the subcortical region beneath the lesion may have caused movements of the eyeballs to the opposite side. After the active period subsided, exhaustion as a result of irritation occurred,

1. Gowers: Diseases of the Nervous System, Philadelphia, P. Blakiston's Son & Co., 1898, **2**, 208.
2. Popper: Monatschr. f. Psychiat. u. Neurol., **39**, 188.
3. Sklodowski: Ztschr. d. g. Neurol. u. Psychiat., **31**, 165.

and then the center of the opposite side provoked a movement.

In a patient studied by Rosenfeld,[4] there was observed head nystagmus and also facial nystagmus; the latter occurred as rhythmic twitchings in one of the branches of the facial nerve, and appeared synchronously with ocular nystagmus. Rosenfeld assumes that there was a bilateral softening particularly in the central ganglions of the cerebrum. He states that vestibular nystagmus is characteristic of a supranuclear lesion.

During infancy, there are sometimes observed imperative movements of the head or nystagmus of the eyes, and occasionally these manifestations are associated; even a family form has been mentioned. However, the condition passes away in infancy or in childhood. Furthermore, the phenomenon probably represents a different disease. Thompson[5] in an article "On the Etiology of Head-Shaking with Nystagmus (Spasmum Nutans) in Infants," writes:

> The condition presented in the following article is a functional, coordinated neurosis of a harmless nature, which affects young infants and has a short, well defined clinical course.

He adds:

> Dr. Alexander Bruce tells me that the nucleus of Deiters (one of the nuclei of the vestibular nerve lying in the lateral angle of the fourth ventricle) is in all probability the seat of the disturbance. He implies this from its connection with the oculomotor nuclei and with the anterior cornua of the cord.

Thompson further remarks:

> It may, however, be said in passing, that head nodding and nystagmus (separate or combined) lasting during life is obviously an essentially different condition from the transitory neurosis with which we are at present dealing.

Nettleship believes that in spasmus nutans ocular nystagmus is never present at birth, and also that patients recover from the condition.

### INFLUENCE OF HEREDITY

In 1911 Nettleship[6] exhibited cases of hereditary nystagmus, some of which manifested head movements. His patients showed that transmission was more frequently through the mother, though not so invariably as in nystagmus without head movements.

To explain this phenomenon, Nettleship says:

> If the object of the head movements were to cancel, neutralize or compensate for the eye movements, i. e., to steady the retinal images, we should expect, I think, that the two movements, although in the same plane and probably equal in rapidity, would have opposite directions.

As to my cases, the head movements and eye movements were in the same plane, but they varied greatly in speed.

Under certain conditions, rhythmical head movements are observed in animals. A well known instance is the weaving of the horse, which consists of lateral oscillatory movements of the head and neck. The habit is observed in some restless horses that are confined too closely to the stable, and therefore has its origin in idleness. Almost every one has observed the weaving of the bear in captivity, and a somewhat similar swaying is seen in the elephant. However, such movements are probably entirely under the control of these animals.

### ETIOLOGIC FACTORS

Ocular nystagmus in man may arise from many nervous diseases or disorders, and the site of origin often varies greatly. Sometimes it is observed in the lower animals. The horse shows nystagmus in epilepsy, meningitis and always in the stage of excitement of chloroform anesthesia. Nystagmus has been observed in dogs born blind and also in those with a congenital underdevelopment of the eyeballs. In certain toxic states the symptom is present in swine, as after drinking brine; in this type the nystagmus is due to the ingestion of a large quantity of sodium chlorid.

The importance of the color of the iris in ocular nystagmus has been commented on. In albinism the irises are without color and persons showing this condition are remarkably nystagmic. Nettleship[7] observed a family in which a number of males had nystagmus and all of these were blue-eyed. In the cases I have studied, dark irises predominated. However, one would hardly expect the color of the iris to have much bearing on nystagmus of central origin, which is the probable seat of the disorder in this family.

As to transmission: in some diseases, such as hemophilia, night-blindness and the myopathies, the transmission is noticeably through the mothers, who are themselves often unaffected. This tendency was observed in the cases I have reported. In both instances in which the fathers transmitted the nystagmic tendency, they were themselves affected, while the mother who handed down the disorder was not nystagmic, but transmitted the affection to her two sons, who were children by different husbands.

Ophthalmologic studies and Bárány tests were not possible since these patients did not wish to submit to an investigation. I am unable to explain the remarkable cephalic and ocular movements exhibited by certain members of this family. Possibly the disorder belongs to the realm of physiologic pathology and is caused by some obscure instability of the centers governing these movements.

2005 Chestnut Street.

### ABSTRACT OF DISCUSSION

DR. I. ABRAHAMSON, New York: Dr. Yawger indicates that the head-nodding and the stammering speech were connected. If this were the case then there would be a quivering of the voice. I think the fact that the stammering speech occurred must be accounted for on other grounds, and not on the ground that there was nystagmus of the vocal cords.

4. Rosenfeld: Ueber Vestibulären Kopfnystagmus und facialis Nystagmus bei Pseudobulbärparalyse, Arch. f. Psychiat., 1914, **53**, 1130.
5. Thompson, in Festschrift in honor of Abraham Jacobi, New York, Knickerbocker Press, 1900, p. 65.
6. Nettleship: Tr. Ophth. Soc., U. Kingdom, 1911, **31**, 159.
7. Nettleship: Royal Ophth. Hosp. Rep., 1886-1887, **11**, 366.

**The Automobile as an Instrument of Death.**—An upward trend in the mortality from automobile accidents is, possibly, to be expected in view of the steadily increasing use of these vehicles. Nevertheless, the continuously climbing death rate is deserving of more than passing notice. In the registration area in 1915, 3,978 persons were killed by automobiles. In 1914, only 2,826 suffered death in this manner. The death rate rose from 4.3 per hundred thousand population to 5.9, an increase of 37 per cent. Had there been seventy-five more deaths from automobile accidents in the registration area, more people would have died in this manner than through surface cars, subway trains, elevated trains, bicycles and all horse drawn vehicles combined.

## FATAL SUPERFICIAL BURNS AND THE SUPRARENALS

### NOTE ON THE OCCURRENCE OF SUPRARENAL LESIONS IN UNCOMPLICATED FATAL CASES OF EXTENSIVE SUPERFICIAL BURNS *

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It is quite generally accepted that clinical manifestations, anatomic findings and experimental evidence all indicate that extensive superficial burns are followed by severe toxemia which not infrequently results fatally within a few days. Of the lesions found at necropsy, emphasis has been placed on cloudy swelling of the liver and kidneys, focal degeneration in the splenic lymph nodules, and degenerative changes in the lymph nodes and intestinal lymph nodules.

My necropsy experience in uncomplicated cases of superficial burns fatal within a few days has shown that, in addition to the lesions mentioned, in all of these cases there occur changes in the suprarenals which are more or less characteristic. In fact, these changes in the suprarenals are the most prominent and characteristic of the necropsy findings.

The suprarenals are markedly swollen and deep red. The perisuprarenal fat tissue shows marked edema. On section, certain areas suggest extensive hemorrhage obliterating the normal markings. On section through other parts, the cortex and medulla appear markedly swollen and show reddish streaks suggesting congestion of the blood vessels.

On microscopic examination, there is evident marked congestion of the blood vessels with scattered areas of hemorrhage penetrating among the parenchymal cells. The gland cells are pale staining and much swollen. Many are apparently undergoing hydropic degeneration. Necrotic cells being invaded by polymorphonuclear and endothelial leukocytes are not infrequent. The picture in general is more or less comparable to the central necrosis occurring in the liver of the guinea-pig in chloroform poisoning, except that in the suprarenals the process is diffuse.

These changes in the suprarenals have been noted at necropsy in cases in which death has apparently resulted primarily from extensive superficial burns of two, three, four and six days' duration. In one case the left suprarenal measured 9 by 3 by 1.5 cm. and weighed 20.5 gm.; the right measured 7 by 4.5 by 2.5 cm. and weighed 25 gm. (average normal weight, from 4 to 7 gm.). This was the case of a railroad fireman, aged 21, who received extensive superficial burns of the face, forearms, thighs and legs as a result of a boiler explosion, and died three days later.

Kolosko,[1] in 1914, described what were apparently similar findings in the suprarenals in a number of fatal cases of extensive superficial burns. He interpreted the findings as representing hemorrhagic infarction of the glands.

It is perhaps noteworthy that these changes in the suprarenals are comparable to the changes occurring in the suprarenals of guinea-pigs dying several days after the administration of diphtheria toxin. This suggests that the changes are the result of the action of a more or less specific toxin possibly somewhat similar to diphtheria toxin.

As far as I know, such marked changes of this character in the suprarenal glands, at least in man, have not been observed in any other condition.

As a result of the foregoing observations, it would seem that these changes in the suprarenals are the best anatomic evidence we have that in extensive superficial burns death may be due to the action of a specific toxin originating probably in the burned areas.

* From the Department of Pathology, Syracuse University College of Medicine.

1. Kolosko: Ueber Befunde an der Nebennieren bei Verbrennungstod, Vrtljschr. f. gerichtl. Med., 1914, **47**, I, Supp. p. 217.

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## THE CAUSE AND PREVENTION OF HERNIA *

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While the etiology of hernia should remain a subject of general interest until greater unanimity of opinion has been achieved, it takes on a more particular interest at this time, when hundreds of thousands of our young men are about to be mobilized. I say "general interest" advisedly because, according to the newer point of view, the problem of prophylaxis must essentially fall on the medical adviser. The considerable gap between the progressive scientific opinion of today and the conception of most practitioners is partly due to the fact that the interest of teachers has run beyond such an ordinary every-day occurrence as hernia into newer fields. Further, it is only natural that a new point of view should have difficulty in making headway against established conceptions — not only natural, but just — for this attitude is our only check against false innovations! The point of view presented in this discussion, however, is not really new, for it has had time to be accepted into many of the progressive texts of anatomy and of surgery. One very practical asset of the newer point of view is that it breaks away from the congenital theory, against which we acknowledge our defenselessness, and offers a positive plan by which, within limitations, hernias may be prevented.

A few lines will suffice to summarize the essential anatomic points. The real strength of the abdominal wall is due to the muscles, aponeuroses and deep fascias. Aponeuroses are simply wide flattened-out tendons, while deep fascias are layers made up of matted white fibrous tissue, which serve to encase all muscles on all surfaces. The five points of naturally lesser strength in the abdominal wall are the umbilicus and the two inguinal and the two femoral regions. The umbilicus is a puckered scar, while the inguinal canals serve as the passageway for the spermatic cord in the male and for the round ligament of the uterus in the female. It is possible to have a hernia follow along any vessel which goes through the abdominal wall, as the vessels start from inside of the inner deep fascia of the wall. Hernias along the femoral vessels, which are much the largest of those leaving the abdominal cavity, are simply relatively more frequent.

The newer point of view maintains that hernia is caused by increased intra-abdominal pressure, which must, however, be maintained during a prolonged period of time. Hernia is obviously not due simply to the strength or weakness of the abdominal wall, for it is a matter of common knowledge that many strong persons have hernias, whereas most weaklings do not. Perhaps the fairest statement is that hernia

* Revision of a paper read at the meeting of the St. Louis Medical Society, April 14, 1917.

is due to a disproportion between the intra-abdominal pressure and the strength of the wall. In contradistinction to former beliefs, it is now held that hernias are invariably developed gradually, this opinion being based on clinical observation and on the anatomic structure of the hernial sacs. If a hernia has descended part way, it may under sudden strain increase rapidly in size; but this is an entirely different matter than really causing a hernia. On account of the valvelike arrangement of the openings in the abdominal wall, a single strain, no matter how great, tends simply to close the walls tighter. For example, the oft repeated experiment of pumping the peritoneal cavity full of air under great pressure in a normal postmortem specimen does not produce hernia.

The theory of congenital malformations as the cause of hernia reached the height of its popularity about twenty years ago. This theory fails, according to those who support the newer point of view, to explain many of the conceded facts. Most of the collected observations were correct, but the fault lay in the logic of interpretation. The persistence of the fetal peritoneal tubes was considered to be a cause of hernia, whereas nowadays the newer point of view maintains that these tubes persist and remain patent because there is increased intra-abdominal pressure. The congenital theory was in reality always more of a mask to cover our lack of knowledge than an explanation. Every person has these fetal peritoneal tubes in the inguinal canal, but no generally satisfactory answer has even been given to the question as to why these tubes persisted in some persons, whereas in most, practically speaking, they disappear. It is worthy of emphasis that no fetal peritoneal tube normally makes its exit through either the umbilical or the femoral regions; therefore the inguinal hernias were the only ones ever covered by the congenital malformation theory. At one time the congenital theory was pretty generally stretched to cover the etiology of most hernias during infancy, and the primary occurrence of hernias during adolescence. Alleged characteristics of congenital malformations were constantly being demonstrated on adults at the operating table, and even the primary hernias of senility were traced to a congenital origin.

A few lines will suffice to summarize our clinical evidence. The occurrence of all five hernias in an individual at the same time is not at all an uncommon clinical finding. For example, a weakly young child or a markedly senile person with chronically increased intra-abdominal pressure commonly presents this picture. The increased intra-abdominal pressure may be due either to chronic gaseous intestinal distention or to a chronic bronchitis or to a chronic obstruction to the urinary outflow. Such cases bear out the modern conception in that they show that all types of hernia have a common underlying etiology, specifically increased intra-abdominal pressure with relative weakness of the abdominal wall. Those of these children that survive their other troubles generally overcome the etiologic factor, and under proper supervision can commonly be cured without operative intervention. The inguinal hernia of adolescence is by all odds the commonest and therefore the most important of the hernias. It occurs much more frequently in the male, and is so frequently bilateral that the probability of a less far advanced hernia on the opposite side must always be carefully considered. The explanation offered for this type is that it is commonly due to excessive intra-abdominal pressure caused by lifting heavier weights, etc., than the youth's abdominal musculature can withstand. But if the youth's abdominal musculature is gradually trained to withstand great pressure, according to the newer point of view, hernia will not occur. The inguinal hernia is much less common in the female, owing probably to the character of the work of females as a group, while the fact that the round ligaments are materially smaller than the cords of the testicles is considered by many to be a factor. The serious types of umbilical hernia are formed during middle life in connection with excessive stoutness. Here we typically have our recognized etiologic factors, that is, weakness of the umbilical region of the abdominal wall due to stretching and greatly increased intra-abdominal pressure. These hernias incapacitate the patients for exercise, and they therefore tend to become stouter. This is a typical vicious circle, which obviously calls for both preoperative and postoperative control of the patients, if the operative mortality is to be held down and the permanency of cure guaranteed.

In the modern surgical technics for the repair of hernias, while the sac is resected as in the earlier operations, more and more stress is being placed on the importance of the repair of the musculofascial layers of the abdominal wall in connection with all types of hernia. In conformity with the conceptions of the time, many of the earlier hernitomy technics resected the sac and disregarded the abdominal wall, which procedure is almost universally condemned by the surgeons of today. In connection with postoperative hernias the main factor is obviously the weakening of the abdominal wall, though eventually the factor of increased intra-abdominal pressure may enter into the problem. The two most common causes of marked weakness in the wall are sloughing of the aponeuroses and paralysis of muscles, the paralysis occurring mediad to the incision and being due to the cutting of nerves. Any one with surgical experience will agree with the proposition that these hernias are more easy to acquire than to cure, although, to be fair, considerable progress has been made during recent years in handling these difficult cases. The point to be emphasized is that the problem of postoperative hernia should be considered in any incision into the abdominal cavity, due regard being paid to the anatomy of the wall, at least whenever this can be done without material sacrifice. If a prophecy is allowable, I wish to register my opinion that, with pioneer work out of the way and with improved diagnosis, the surgeon of the future will develop an improved prophylaxis against postoperative hernia.

This concludes the brief of my argument for the newer point of view. It has the natural prejudice of established conception to contend with, but on the other hand has the advantage of assuming a positive attitude toward the prevention of hernia. Even those who cannot bring themselves to concede the validity of the argument in its entirety certainly cannot object to the practical kernel of this discussion, to wit, the importance of the gradual training of the strength of the abdominal wall. If I read correctly the temper of our young men about to be called to the colors, many more will require the check-rein than the spur — and for those who accept the point of view presented, one of the reasons for their position is the risk of causing hernias.

Wall Building.

# VALUE OF BLOOD PRESSURE DETERMINATIONS IN THE PRACTICE OF OBSTETRICS *

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The clinical usefulness of blood pressure determinations finds better illustration nowhere than in the practice of obstetrics. The supervision of women during pregnancy, it is well known, requires systematic observation of this kind; not infrequently it gives the first warning of an impending toxemia and affords a measure of its seriousness. When conservative treatment is unavailing, the persistence of arterial hypertension becomes a strong reason for the termination of pregnancy, as a means of preventing convulsions. And, though less appreciated, there are other uses for blood pressure determinations in obstetrics which deserve an equal prominence. In the period of convalescence after eclampsia, for example, blood pressure determinations have proved to be an excellent guide to the ultimate prognosis for these patients.

The clinical interpretation of autointoxication during pregnancy, in many ways as hazy as it ever was, still depends on secondary or even more remote effects of the responsible poison; the primary cause of the

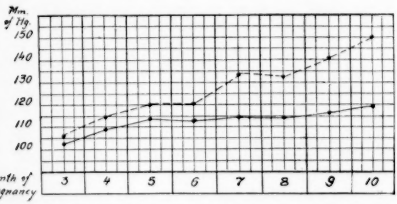


Chart 1.—Systolic blood pressure during normal pregnancy. The monthly average is represented by the solid line. The tension indicated (115 mm. of mercury) is considered normal. The broken line indicates the highest observation during each month. A pressure of 150 mm. of mercury should be regarded as an early sign of preeclamptic toxemia.

albuminuria of pregnancy and its alarming sequelae remains unknown. In search of the cause of eclampsia, investigators have not been helped materially by detailed analysis of the urine to determine the character and the quantity of the waste products it contained. Likewise, chemical analysis of the blood has been disappointing. As the latter method provided a nearer approach to the source of the toxic agent, there was reason to hope that its real nature would thus be revealed. However, this goal has not been attained; nor in the course of blood analysis has there been found a more reliable therapeutic guide than we previously possessed. Of this result I speak confidently, for during the past two years I have studied the blood of fifty cases of preeclamptic toxemia, eclampsia and allied intoxications and have determined the quantity of many of its constituents, including the nonprotein nitrogen, amino-acids, urea, uric acid, sugar, lipoids and calcium. Estimations of the capacity of the plasma for combining with carbon dioxid, generally accepted as a method for detecting the presence of an acidosis, have also been made. Unusual values for these various factors are frequently found, but no constant relationship exists between any of them and the complications of pregnancy in question; and, therefore, the changes noted in the composition of the blood seem to be of a secondary character.

As the more intimate study of the urine and the blood has not brought us nearer to the solution of the eclampsia problem, the seriousness of albuminuria during pregnancy is determined from less satisfactory evidence than that available in some metabolic disturbances, as diabetic coma, the cause of which has been definitely ascertained. It is not implied, however, that excellent rules for the treatment of preeclamptic toxemia are lacking. The careful supervision of pregnant women serves effectively to protect them from eclamptic convulsions and, for this purpose, very simple observations are required. These include, first, accurate measurement of the quantity of urine voided during a period of twenty-four hours; second, estimation of the quantity of albumin by the Esbach tube, if albumin is present in measurable amount, and third, determination of the systolic arterial pressure. For several reasons, it is advisable to include the blood pressure in these observations: the technic is not difficult, the information gained is objective, and our experience has reached the point at which sufficiently definite rules for the interpretation of the findings may be formulated.

Obviously, in the presence of complications of pregnancy, the significance of the arterial tension will depend on knowledge of the tension in normal cases. There have been a number of statistical studies of this question, and fairly uniform results have been obtained, though the data collected thus far relate chiefly to the latter months of pregnancy. Interest in this period was the greater because it presented a tendency toward hypertension, whereas in the early months normal values were observed. These facts indicated an upward trend in the systolic pressure even during normal gestation. To secure first hand information regarding this phenomenon, Dr. A. H. Yudkin recently tabulated and analyzed the prenatal records of 500 normal obstetric cases treated in this clinic; his results are graphically represented in Chart 1.

In the average case, as indicated by the solid line in Chart 1, the systolic pressure during pregnancy remains within normal limits, although in the early months the values are somewhat lower, and in the later months somewhat higher, than are found in the middle trimester of gestation. From the fifth to the eighth month, the prevailing tension, 115 mm. of mercury, is identical with that generally considered normal.

Hypotension is more common in the early months of gestation, but may also occur in the later months, and is then said to be prophetic of shock during the approaching labor. In my experience, however, a systolic pressure of 90 mm. of mercury in the last month of pregnancy has not been incompatible with normal parturition.

On the other hand, the maximum degree of tension presented by normal cases is a question of great practical moment, for, if possible, we wish to know what height of pressure gives warning of impending eclampsia. Not infrequently in the latter half of pregnancy, hypertension occurs in patients who proceed

* From the Department of Gynecology and Obstetrics, Yale University School of Medicine.
* Read before the Section on Obstetrics, Gynecology and Abdominal Surgery at the Sixty-Eighth Annual Session of the American Medical Association, New York, June, 1917.

normally to term and pass safely through delivery. Even a pressure of 150 mm. of mercury may not indicate the existence of serious toxemia. Nevertheless, in these circumstances it is advisable to regard the hypertension as the earliest sign of preeclamptic toxemia, and, so regarded, it affords the opportunity to institute conservative treatment at a time when it is most likely to be effective. Consequently, my custom is to make daily observations on patients with a blood pressure of from 140 to 150 mm. of mercury. Hygienic, dietary and medicinal measures are begun and, when these are ineffective, labor is induced by the use of a uterine bougie.

While the greatest service of blood pressure determinations during pregnancy is to warn the physician that his patient is threatened with eclampsia, occasionally, even in the face of albuminuria such observations teach that the complication is not preeclamptic toxemia. This use of blood pressure was brought home to me in the treatment of a patient whose urine contained 3 gm. of albumin per liter though the systolic pressure was 135 mm. of mercury. In this instance, the responsible complication was pyelitis, and recovery followed the administration of urinary antiseptics.

The third useful purpose of blood pressure determinations in the practice of obstetrics pertains to the prognosis in cases of eclampsia. While the disease is in progress, the persistence of a high arterial pressure means that the therapeutic measures adopted have as yet been unavailing; a falling pressure, on the other hand, usually denotes clinical improvement and becomes a convenient measure for the degree of this improvement. But there are occasional exceptions to this rule, as when the pressure falls because of hemorrhage or of shock. The latter was responsible for the systolic pressure reaching 70 mm. of mercury in one of the patients, and here, of course, the subsequent rise in pressure denoted improvement. Generally, however, it is the opposite phenomenon which signifies that treatment has been successful.

The fall in blood pressure coincident with convalescence from eclampsia is illustrated by Chart 2. When admitted to the hospital, already in labor, this patient was suffering from a severe toxemia, though the first convulsion did not occur until after she was delivered. Venesection was then performed, but was of only temporary benefit. Various other therapeutic measures were tried, including the administration of morphin and cathartics, the use of hot packs and hypodermoclysis. As the patient was rapidly growing worse, we resorted to lumbar puncture, which had been found useful in two cases reported by Wilson.[1] Following this treatment there was only a slight convulsion, and within a few hours notable clinical improvement began.

Encouraged by this favorable experience the method has been given further trial; I have employed lumbar puncture in four other cases. One of these — probably a case of acute nephritis at the seventh month of pregnancy — was not benefited, and, similarly, another patient with antepartum eclampsia did not improve after a lumbar puncture. On the other hand, two desperate cases of postpartum eclampsia improved immediately following the treatment in question. Therefore, while in my judgment lumbar puncture may not be implicitly relied on, it adds another procedure to be employed when convulsions continue after the patient has been delivered or when they first appear in the postpartum period.

The diastolic pressure is somewhat elevated in preeclamptic toxemia and eclampsia, though not to the same extent as the systolic pressure. Likewise, the pulse pressure, while increased, provides no better, if as good a guide, for treatment. Variations of the pulse pressure are less emphatic than in the case of the systolic pressure and, therefore, the latter is preferable as a clinical index.

In the fourth place, blood pressure observations are valuable because they assist toward reaching an ultimate prognosis in cases of albuminuria of pregnancy and eclampsia. This, of course, is of great moment; the patient wishes to know in the event of subsequent pregnancy whether or not she is likely to encounter the complication again.

From the statistics of hospitals and of private practice, it appears that one of every five or six women who suffer from a high grade albuminuria during pregnancy sustain permanent damage to the kidneys and, therefore, may expect complications in later pregnancies. To distinguish these types of cases, with favorable and unfavorable prognosis, there is no means so satisfactory as the study of the blood pressure during the period of convalescence. Using this criterion in the study of fifty-two patients recovering from severe albuminuria, I have found that three groups may be distinguished. (1) Cases in which the blood pressure returned to normal within two weeks after delivery. Of these there were thirty-nine, or 75 per cent. of the series. Many of these women who suffered from convulsions during one pregnancy subsequently have passed through another without untoward symptoms; and on these grounds, I believe the ultimate prognosis for this group is favorable. (2) Cases in which hypertension persisted in the puerperium for a period of from six to eight weeks, a phenomenon indicative of permanent renal injury. In the series, there were five instances of this kind, or 10 per cent.; on discharge, their systolic pressures were, respectively, 150, 160, 180, 200, and 250 mm. of mercury. Subsequently three of these women required the interruption of pregnancy on account of nephritis, and it is reasonable to believe the prognosis is always unfavorable in this group. (3) Cases in which slight hypertension prevailed at the end of a month postpartum. In the series there were eight instances of this type, or 15 per cent. The prognosis is doubtful in these circumstances. Some of these

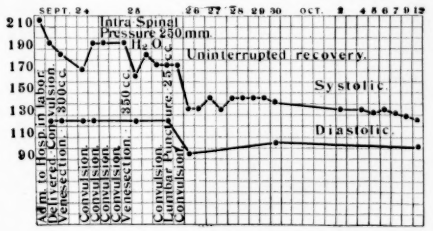


Chart 2 (Case 59173).—Systolic and diastolic pressure in eclampsia. Marked fall in blood pressure coincident with convalescence. Lumbar puncture especially caused decided reduction of pressure and improvement in the symptoms.

1. Wilson, W. T.: Lumbar Puncture for the Relief of Convulsions in Puerperal Eclampsia, THE JOURNAL A. M. A., Sept. 2, 1916, p. 742.

women later passed through pregnancy normally, while others again suffered from serious albuminuria.

Briefly, then, my experience indicates that daily observations of the blood pressure during the puerperium of women convalescent from eclampsia and from less severe forms of albuminuria, enables the physician to reach a correct ultimate prognosis in approximately 85 per cent. of the cases.

Finally, blood pressure determinations are valuable as a guide for the treatment of patients suffering from cardiac complications during pregnancy. The patient whose systolic pressure is represented by the upper curve in Chart 3 had no special care during pregnancy and was referred to the hospital by a midwife. She was extremely ill because there was decompensation of the cardiac lesion, and also because she suffered from toxemia of pregnancy. After three days of observation, delivery was effected by cesarean section under nitrous oxid anesthesia. Clinical improvement began immediately, but progressed slowly, and the patient's recovery was uncertain for several weeks.

The second patient (lower curve) was carefully watched during the latter half of pregnancy. Renal complications did not develop, full term was reached, and delivery occurred normally. The credit for this satisfactory result belongs no less to the systematic

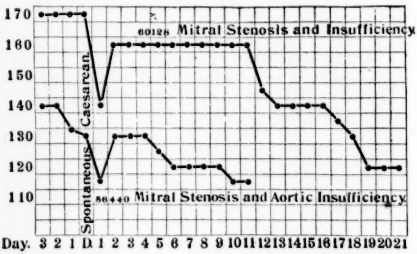


Chart 3.—Systolic pressure in patients having cardiac lesions. The top line (Case 60128) shows the pressure in a case of broken compensation and albuminuria; delivery was made by cesarean section. The lower tracing (Case 56440) illustrates the pressure in a case in which the heart lesion is well compensated, and without renal change; normal delivery at full term occurred.

observation of the blood pressure than to the care given the urinalyses. In this way, there was a rational basis for the advice the patient required; and she was safeguarded against the development of such serious complications as existed in the case first mentioned. If the pregnancy is properly supervised, there is opportunity to employ conservative therapeutic measures before the load becomes too great to be carried. And as renal complications are especially prone to develop in such cases, blood pressure determinations are imperative when pregnant women present cardiac lesions.

Blood pressure determinations thus far have not proved to be of material value toward predicting a break in cardiac compensation during pregnancy. In the presence of valvular lesions, the questions of fundamental interest are: As pregnancy advances what load will the heart eventually have to carry? And, in a given case, will the particular heart be equal to this task? Probably it will always be difficult, or even impossible, to find precise answers to these questions, but we shall have more accurate data for an opinion than is now available. A trustworthy method for estimating the work the heart is doing will provide such data, and this in turn will partly depend on knowledge of the blood pressure. By this means, then, it is not unlikely that we shall become able to decide whether or not the induction of labor is advisable as a prophylactic measure in cases of chronic valvular heart disease.

## CONCLUSIONS

1. Blood pressure observations afford the means for the early detection of preeclamptic toxemia and for the determination of the severity of the autointoxication.

2. They are useful occasionally in the differentiation of pyelitis from the albuminuria of pregnancy.

3. They provide a measure of the efficiency of treatment during active eclampsia.

4. They afford a method of arriving at the ultimate prognosis in these cases.

5. When patients are carrying the double burden of a chronic valvular heart lesion and a toxemia, familiarity with the blood pressure is indispensable as a therapeutic guide.

6. Since knowledge of the blood pressure is required for the estimation of the work the heart is doing, probably by this means we shall acquire a more timely method of recognizing the approach of a break in compensation in cases of chronic valvular heart disease and, therefore, of deciding the question of inducing labor as a prophylactic measure.

284 Orange Street.

## ABSTRACT OF DISCUSSION

DR. F. ASHLEY FAUGHT, Philadelphia: I regret that Dr. Slemons did not include the diastolic and pulse pressure in his study. I believe it is important if we are to get the chief value of these observations, to have preliminary records of the blood pressure of these patients before they become pregnant. We are then better able to judge of the relative bearing of variations in systolic pressure during pregnancy. In my observations the general average of records is systolic, 119; diastolic, 78; pulse pressure, 41. This corresponds with the 3, 2, 1 ratio; that is, the pulse pressure is three times the systolic pressure and twice the diastolic. These figures obtain in normal cases with slight variations. The low systolic pressure rises shortly before the fifth month; there is then a slight drop, with a rise again toward the end of pregnancy. On the contrary, the pulse pressure tends to become smaller, and my figures show that the pulse pressure falls from an average of 44 mm. in the second month to an average of 38 mm. during the last week of gestation. This is the direct result of a rise in the diastolic pressure. In studying some abnormal cases, even where there was not a decided rise in the systolic, I was surprised to find the pulse pressure in these toxic cases become much larger; in my series, 52.5 mm., average, as against 41 in the normal.

Another point for further investigation is that of the adequacy of the cardiovascular system in the latter months of pregnancy. Dr. Slemons has brought out an idea contrary to that usually suggested, and his experience has been sufficiently large for us to agree with him in this matter.

In regard to the value of the systolic pressure in relation to toxemias, those cases I have had opportunity of studying fell into many classes, none of which can be definitely picked out and pointed to as an example, so that I very much question whether the rise in pressure during pregnancy always is an indication of a dangerous toxemia.

DR. J. MORRIS SLEMONS, New Haven, Conn.: The greatest obstetric value of blood pressure obervations is in connection with the early recognition of toxemias of pregnancy, but the diagnosis must not rest on blood pressure alone. I made that clear when I said that one must take into account at least three points in determining what form of treatment should be adopted, namely, the amount of urine passed in

the twenty-four hours, the degree of albuminuria, and the blood pressure. The importance of taking all this evidence into account is emphasized by what Dr. Faught has said. My experience agrees with his; in more than one instance I have seen patients with blood pressures of 180 and 190 go through labor without complications. But this is exceptional, and in these cases there was not a measurable amount of albumin and the output of urine in the twenty-four hours was normal. Therefore, we cannot depend on the blood pressure alone. If the quantity of urine and the degree of albuminuria, as well as the blood pressure, are accurately observed, the treatment will rest on the most rational basis.

## DIVERTICULITIS OF THE LARGE INTESTINE *

WILLIAM J. MAYO, M.D.
ROCHESTER, MINN.

In a paper on acquired diverticulitis of the large intestine, in 1907, Wilson, Giffin and I[1] were able to demonstrate the pathology and to outline the clinical history of the condition to which Graser[2] called attention in 1898. Our five cases in which the diverticulous sigmoid was excised proved to be the first recorded in which an actual demonstration of the pathology of diverticulitis was established during life. Articles dealing with postmortem demonstrations of

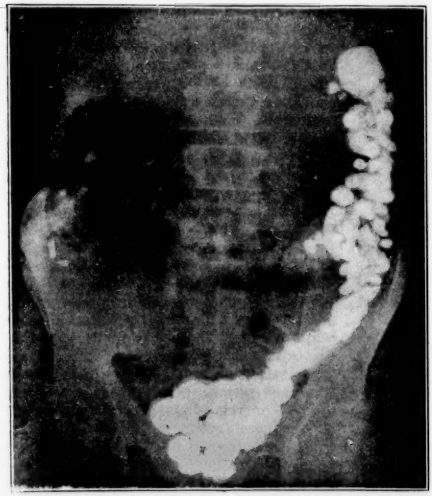

Fig. 1.—Symptomless diverticula of the sigmoid.

diverticula of the colon had been rather frequent,[3] and suggested an explanation of clinical experiences such as those recorded in the contributions of Telling,[4] Brewer,[5] Beer,[6] Plummer[7] and others.

Since the recognition of the condition, we have resected portions of the large intestine for diverticulosis in forty-two cases. In thirty-six the sigmoid was involved, in one the transverse colon, in one the ascending colon, in one the hepatic flexure and cecum, in one the rectosigmoid juncture, and in two the rectum. The number of cases in which resection was not done but in which the patient was operated on for

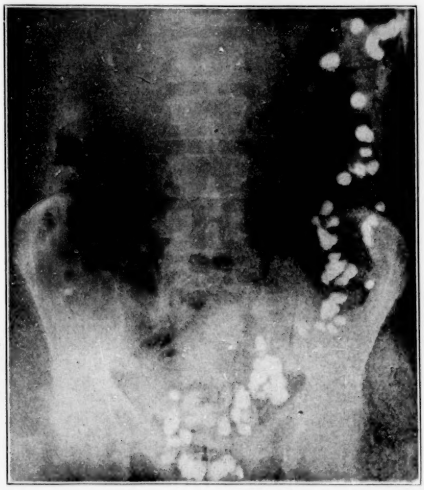

Fig. 2.—Symptomless diverticula of the sigmoid.

abscess, fistula, etc., is not given because the presence of diverticula was not proved by the demonstration of the specimen. The diverticula were all of the acquired variety; that is, the mucous coat pouched through small openings in the musculature in contradistinction to true diverticula of the congenital, traction, or pulsion types in which all the intestinal coats cover the sac. The diverticula were multiple and occurred at any weak point in the circumference of the colonic wall, such as vessel holes or muscle defects. From 1 to 8 inches of the intestine were seriously involved, although much longer stretches showed a diverticulous tendency. Hardened masses of feces were often found in the distal extremity of the narrow-necked diverticula, although, as a rule, only one or two of the diverticula were directly responsible for the existing diverticulitis and peridiverticulitis.

The signs and symptoms closely resembled those of appendical inflammation, with the marked difference that in the great majority of instances the disorder was on the left side of the abdomen. It is altogether

* Read before the Section on Obstetrics, Gynecology and Abdominal Surgery at the Sixty-Eighth Annual Session of the American Medical Association, New York, June, 1917.

1. Mayo, W. J.; Wilson, L. B., and Giffin, H. Z.: Acquired Diverticulitis of the Large Intestine, Surg., Gynec. and Obst., 1907, **5**, 8-15.
2. Graser: Ueber multiple Darmdivertikel in der Flexura sigmoidea, Verhandl. d. deutsch. path. Gesellsch., 1899, Berlin, 1900, pp. 254-256.
3. Gordinier, H. C., and Sampson, J. A.: Diverticulitis (not Meckel's) Causing Intestinal Obstruction, THE JOURNAL A. M. A., May 26, 1906, pp. 1585-1590. McGrath, B. F.: Intestinal Diverticula: Their Etiology and Pathogenesis, with a Review of Twenty-Seven Cases, Surg., Gynec. and Obst., 1912, **15**, 429-444.
4. Telling, W. H. M.: Acquired Diverticula of the Sigmoid Flexure, Considered Especially in Relation to Secondary Pathologic Processes and their Clinical Symptoms, Lancet, London, 1908, **1**, 843-850, 928-931.
5. Brewer, G. E.: A Consideration of the Etiology of Certain Cases of Left-Sided Intra-Abdominal Suppuration (Acute Diverticulitis), Tr. Am. Surg. Assn., 1907, **25**, 258-269.
6. Beer, E.: Some Pathologic and Clinical Aspects of Acquired (False) Diverticula of the Intestine, Am. Jour. Med. Sc., 1904, **128**, 135-145.
7. Plummer, S. C.: Technique of Removal of Tumors of the Large Intestine, Causing Obstruction, Surg., Gynec., and Obst., 1906, **2**, 696-697.

probable that most of the reported cases of so-called "sigmoiditis" are examples of diverticulitis

Of the forty-two patients in whom resection was done, 66.6 per cent. were males and 33.4 per cent. females. The average age was 53 years. The youngest patient was 27 years of age and the oldest 73. The average weight was 175½ pounds. The heaviest patient weighed 225 pounds, the lightest 120 pounds. Those of light weight were below their average weight for the previous ten-year period. In many cases, increased deposit of fat in the abdominal cavity undoubtedly had some influence in the development of the diverticula, especially if there had been a tendency to the formation of intestinal gases. The average duration of symptoms was two years; the longest twelve years; the shortest seven days.

Fig. 3.—Carcinoma of the sigmoid developing on diverticulitis. Specimen to be sectioned through orifices of diverticula, at Lines *A* and *B* (see Figures 4 and 5).

In thirty-four of the forty-two patients, a sensitive tumor was present in the left iliac fossa during the attack, which was attended by localized peritonitis and often by intestinal obstruction. In two patients, diverticula were found in the rectum. C. H. Mayo[8] has shown that occasionally a deep-seated infection about the rectum eventuating in long fistulous tracts extending from the perianal region into the pelvis has this origin. Twenty patients had pain in the left iliac fossa. In thirty-two constipation was marked. A diagnosis of inflammatory disease was made in twenty of the forty-two cases. The Roentgen ray showed obstruction, but in acute obstructions it did not differentiate diverticulitis from carcinoma, although it usually made the differentiation in chronic disease. Carcinoma was present in thirteen cases (31 per cent.).

Clinically, cases of diverticulitis may be readily classified into four groups:

Group 1. *Self-Limiting Diverticulitis and Peridiverticulitis.*—This group includes fleshy, middle-aged persons who present themselves with an acute sensitive tumefaction in the left iliac fossa. The mass gradually disappears in the course of some days, with restoration to health. The disturbance is due to irritation of fecal concretions, dead epithelium and other contents in the thin-walled, narrow-necked sacs, which cause obstruction from edema and infection and penetration of bacteria to the peritoneal surface. There is marked tendency to relapse quite similar in character to that of relapsing appendicitis, and in the early histories of the patients of Groups 2, 3 and 4, it will often be found that several such attacks had occurred before the severe attack which necessitated surgical interference. That diverticulitis does not always produce trouble is shown by the relative frequency with which this condition is found postmortem, by the frequency with which diverticula of the sigmoid are a chance finding in the course of abdominal operations for other purposes, and by the frequency with which routine Roentgen-ray examination of the colon shows symptomless diverticula. We should not assume, therefore, that the presence of these diverticula, or even a single mild attack of diverticulitis which quickly subsides without obstruction or other serious symptoms, necessitates operation. Patients of this kind are often poor surgical risks from other causes, such as obesity, and a considerable mortality attends resection, the only operation that really cures the disease. It is only in those cases, therefore, in which the symptoms are serious or the disease becomes chronic or relapsing that operation is to be considered.

Group 2. *Diverticulitis and Peridiverticulitis with Formation of Abscess Resulting in Enterovesical, Enterocutaneous and Other Fistulas.*—This group includes those cases in which infections — either a developing peritonitis with abscess formation or the results of infectious processes which connect the diseased colon with the cutaneous surface, the bladder, or neighboring intestine — lead to the necessity for surgical interference. The rule is that if an abscess forms it should be opened and drained, but a serious attempt should not be made at the primary operation to remove either the infected diverticula or the section of colon which contains them. None of our patients has died from a general septic peritonitis as the primary result of diverticulitis, although such cases have

8. Mayo, C. H.: Diverticula of the Gastro-Intestinal Tract: Their Surgical Importance, THE JOURNAL A. M. A., July 27, 1912, pp. 260-264.

been reported. The management of cases of complicated fistulas in which there are openings into the bladder and colon and to the cutaneous surface, and especially that most common type in which an internal fistula connects the bladder and the sigmoid, is very difficult. The obesity of the patient and the enormous amount of scar tissue which surrounds the fistulous tracts add greatly to the operative difficulties. In enterovesical fistulas we have opened the peritoneal cavity, dissected out the fistulous tracts, and closed the openings in the bladder and colon with chromic catgut sutures. Rarely was the result immediately satisfactory. As a rule, a temporary fecal fistula to the surface formed after a few days, but when, following operation, the bladder and sigmoid were kept separated by rolls of rubber tissue, and especially when the sutured opening in the sigmoid was protected by omentum, these secondary fistulas eventually closed spontaneously. A retention catheter has been placed in the bladder for a week and a rubber tube fastened into the rectum following operation, to relieve tension.

Group 3. *Obstruction.*—In acute diverticulitis the obstruction is the result of infection and edema. Chronic obstruction is due to hyperplasia, adhesions and angulation — the hyperplastic stenosing type. The condition is practically identical with those in Groups 1 and 2, but the addition of the obstruction in these cases is so serious a feature that it seems best to classify them independently. It was most surprising, however, when the entire mass was dissected out and the diseased bowel laid open, to find so little actual obstruction. In this group a tumor is usually found, and in 31 per cent. malignant disease coexists. I do not know of a more difficult differentiation than to foretell whether a given obstructing tumor deep in the iliac fossa of an adipose patient is diverticulitis or carcinoma or both. On a number of occasions I have gone down on such tumors which had been explored and pronounced inoperable by surgeons of skill and experience, and on dissecting the tumor out, found that it was diverticulitis without carcinoma and that the enlargement of the lymphatic glands, which had been one of the determining factors in estimating inoperability at the previous exploration, was due to sepsis. As a rule, the obstruction from diverticulitis is not quite complete. In this respect it differs from that of carcinoma, in which condition complete obstruction may be the first symptom of the disease. Several times, with great difficulty, I have dissected out a considerable portion of the sigmoid and found that the infection involved only one or two diverticula. Therefore the offending diverticula might have been excised and the patient spared the risk of the more serious operation. In two cases it was possible to excise infected diverticula successfully and separate the obstructing adhesions. On a few occasions a tumor was explored because of our inability to differentiate diverticulitis from carcinomatous disease. After a diagnosis of diverticulitis was established, drainage was instituted for the relief of the local peritoneal infection, with recovery of the patient. Fortunately, the Roentgen ray now furnishes the differentiation in a high percentage of cases. In acute obstruction it may be necessary to make a colostomy close to the obstructing mass so that the colostomy and tumor may be excised together at a second operation; or perhaps a better plan is to do a complete ileostomy for temporary relief, then resect later, and finally, as a third stage, restore the ileum to the cecum.

Fig. 4.—Half of the specimen shown in Figure 3, after a longitudinal division at Line *A*, showing courses of diverticula about which carcinoma has developed.

GROUP 4. *Carcinoma Developing on a Diverticulum.*—This group is of great interest. Among the forty-two cases of resection for diverticulitis, there were thirteen in which carcinoma coexisted. The carcinoma had such definite relationship to the diverticulitis as to make it reasonable to assume that infection and irritation by hardened fecal masses in diverticula were the cause of chronic irritation and pre-

cancerous change. The only known fact of importance in the etiology of carcinoma is its relation to chronic irritation. The term "precancer" is used to denote certain cell changes taking place in the area of chronic irritation which, if found in connection with invasion of the tissues, would be typical of carcinoma.

Giffin[9] found that for every sigmoid resected in our clinic for diverticulitis, seven had been resected for carcinoma. Our statistics show that in 300 resections for carcinoma, 180 were for sigmoid growths. In forty-two cases of diverticulitis of the large intestine, the diverticula were in the sigmoid in thirty-six. It has often been pointed out that carcinoma of the colon, especially of the sigmoid, may progress very slowly. Cases have been reported in which a colostomy was made for the relief of obstruction due to supposed carcinoma; the patients lived for a number of years and then died with carcinoma of the sigmoid, a fact which apparently proved that the condition had been carcinoma from the beginning and that the natural course of the disease had continued for eight or nine years. This inference is unwarranted. We have operated in several cases of this type, and on resection of the mucosa. There was no carcinoma in the sigmoid, the malignant process being confined strictly to the diverticulum and the transverse colon. At the present time it is usually possible to differentiate between diverticulitis and carcinoma by the Roentgen ray since in carcinoma a filling defect will be found in addition to the less reliable findings of blood, pus, and mucus in the stool. With the sigmoidoscope we have been able to differentiate carcinoma associated with diverticulitis of the lower sigmoid and rectosigmoid, but have not been able to demonstrate diverticula.

Some of our patients with carcinoma associated with diverticula gave a long history of having had, at various times, inflammatory attacks with development of tumefactions which disappeared. After the carcinoma developed, the symptoms became more or less continuous. In reviewing a series of early specimens of sigmoid resected for supposed carcinoma, Wilson[10] found that three which had been resected years ago, before all specimens were subjected as a routine to microscopic examination, showed diverticulitis and no carcinoma. The association of carcinoma with diverticulitis leads to the conclusion that when a tumor appearing to be diverticulitis but without acute symptoms is found in the sigmoid or colon, and especially if the tumefaction only partially subsides and then continues as a chronic mass causing symptoms more or less marked, carcinomatous change is to be suspected and resection should be done. If there is definite obstruction at the time, or if the disease is advanced, the two-stage operation of Mikulicz, Bruns and Paul, as described by C. H. Mayo, may be adopted. Frequently, instead of leaving the tumor attached in the wound, we have cut the protruding bowel and tumor off, leaving the two ends of the intestine closed by a clamp on each, suturing the intestinal stumps into the wound behind the clamps and thoroughly covering the parts with petrolatum. After from twenty-four to forty-eight hours, or as long as the patient was able to stand the gas pressure from the complete obstruction, the clamps were removed. The suggestion of Peck[11] to leave the ends of the intestine closed for some hours until adhesion takes place has been of great value on a number of occasions, and permits primary union of the operative wound.

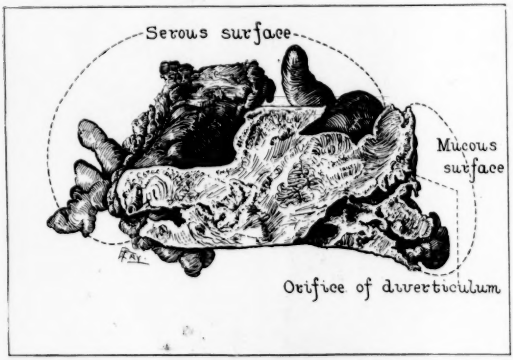


Fig. 5.—Half of section shown in Figures 3 and 4, after a horizontal division at Line *B*. Course of diverticulum through the orifice through which Line *B* passes.

growth found carcinoma developing on old diverticulitis. In tracing the early history it could be seen that the diverticulitis had been the cause of the obstruction for which the colostomy was done and that the carcinoma had developed at a much later date as the result of the chronic irritation. In one rather remarkable case, a supposed carcinoma of the sigmoid, associated with a carcinoma of the transverse colon, was found on exploration. I removed the left half of the transverse colon, the splenic flexure, the descending colon, and part of the sigmoid, uniting the remainder of the transverse colon to the lower sigmoid. When the specimen was unraveled, it proved to be diverticulosis of 6 inches of the sigmoid. The carcinoma had developed on one diverticulum which had become adherent to the transverse colon, and had spread into the peritoneal, muscular and submucous coats of the transverse colon without penetrating the

Of forty-two patients with diverticulitis, with and without carcinoma, on whom we have done resections, 14 per cent. died as the result of the operation; that is, within four weeks. The mortality was high, but it must be taken into consideration that these patients were usually adipose, and it was often necessary to operate during the stage of obstruction, infection, etc. A large majority of the fatalities occurred in the earlier period when it was believed that the tumefaction was due to carcinoma, and extensive dissections seemed to be indicated. It is of great value, therefore, to be able to differentiate between diverticulitis and carcinoma, as in diverticulitis the removal of the mass of tissue which would be essential in carcinoma is not necessary. When a primary resection was made, we

9. Giffin, H. Z.: Diverticulitis of the Rectum, Ann. Surg., 1911, **53**, 533-537; The Diagnosis of Diverticulitis of the Large Bowel, A Clinical Review of Twenty-Seven Cases, THE JOURNAL A. M. A., Sept. 14, 1912, pp. 864-866. Giffin, H. Z., and Wilson, L. B.: A Case of Carcinoma on Diverticulitis of the Sigmoid, Am. Jour. Med. Sc., 1909, **137**, 661-666.

10. Wilson, L. B.: Diverticula of the Lower Bowel: Their Development and Relationship to Carcinoma, Ann. Surg., 1911, **53**, 223-231.

11. Peck, C. H.: Diverticulitis, Tr. New York Surg. Soc., 1910; Ann. Surg., 1910, **52**, 264.

employed an end-to-end union, but as a rule found it wise either to suture the anastomosed area well up into the peritoneum and leave the suture line exposed, or to pass a folded strip of rubber tissue entirely around the anastomosis to suspend it in the wound, as there was a tendency to late infections, and unless provision was made for drainage, slowly progressing peritonitis occasionally caused death. To provide against gas pressure we have sometimes passed a good-sized red rubber tube by way of the rectum entirely through and well above the anastomosed area and fastened it with a single suture to the anus.

In very extensive cases with obstruction, Balfour[12] advises making a complete ileostomy close to the cecum after the manner of Brown,[13] bringing the end of the ileum out through a small opening in the right

Fig. 6.—Carcinoma developing on diverticulitis.

side and closing its distal end completely, thus entirely diverting the intestinal contents from the large intestine. A cecostomy is made at the same time for cleansing the colon. This renders a resection of the involved colon much safer subsequently. Later, the end of the ileum is joined to the cecum end-to-side. A great advantage of this procedure is that the colon can be cleansed and maintained empty, and soon becomes nearly free from bacteria. Considerable experience with complete ileostomy in the management of ulceration of the colon has shown that the patient maintains weight and excellent health, and that the disability is not at all so great as would be thought. After several weeks the stool becomes partly formed, is easily caught and contained in any one of the various colostomy bags, and there is much less odor than with a colostomy. I venture to say that, on the average, an ileostomy is much less of a nuisance than a colostomy.[14]

12. Balfour, D. C.: Meckel's Diverticulum: A Report of Fifteen Cases, Jour. Minnesota Med. Assn., 1911, **31**, 110-112.
13. Brown, J. Y.: The Lane Operation: The Indications for and the Limitations of the Procedure, with a Discussion of the Principles Underlying It, Tr. South. Surg. and Gynec. Assn., 1911, **24**, 137-150.

## ABSTRACT OF DISCUSSION

DR. D. ROBERTS, Brooklyn: I am sure that diverticula are common in the colon. In a large percentage of cases the symptoms are mild. It is significant that patients with lower abdominal pain have been entirely free from such pain after a dose of barium or of bismuth. When there is partial obstruction of the colon, care should be taken to avoid complete obstruction by stirring up an old constipation, making acute symptoms. In diarrhea with fecal obstruction, which these people complain of, patients do better without laxatives than with them, because they make the feces liquid and consequently more irritating.

DR. MILES F. PORTER, Fort Wayne, Ind.: In a patient brought into the hospital for the relief of intestinal obstruction, after a hasty examination I opened the abdomen and concluded that I had to deal with inoperable cancer of the sigmoid. I therefore divided the intestine, dropped the lower end and brought up the upper end under the impression that my patient would be relieved so far as surgery could do this by making an artificial anus and giving the lower portion opportunity to rest, my idea being that she would at least be comfortable in the short time she had to live. A few months later I was requested to visit her town for the purpose of closing her fistula. I declined on the ground that her fistula was necessary to life. The woman after years is living today with her fistula closed by nature, a monument to my ignorance. In other words, she had a diverticulitis which I regarded as an inoperable cancer. The second point in regard to this case is that the diverticulitis is cured, but is she still having a slowly growing cancer? I appreciate what Dr. Mayo said about that, but the case occurred more than eight years ago. The woman, when I last heard from her a few months ago, was in perfect health. The case suggests that it would be wise in many of these cases, when we are in doubt, to adopt the two-stage operation, doing a colostomy and allowing the patient to rest for three or four weeks. You will be surprised to find how comparatively easy it is to remove radically the carcinoma that is left behind. It has been my misfortune to see patients brought into the hospital with diffuse peritonitis from a perforated diverticulum who have died in spite of our efforts to relieve them.

DR. W. J. MAYO, Rochester, Minn.: As a rule, I think the majority of cases give symptoms at times, but in many instances not enough to justify operation, although one should operate if recovery from an acute attack does not rapidly take place, provided the patient is a good surgical risk. In forty-two consecutive cases in which resection of the sigmoid was performed, three, which we believed to be carcinoma, proved to be diverticulitis. There is a possibility of carcinomatous degeneration in about 31 per cent. A number of patients who came to us had had colostomy, as described by Dr. Porter. But these patients with diverticulitis did not have histories and findings that were indicative of carcinoma. Sudden obstruction and a tumor mass adherent to the back of the bladder or the side of the pelvis or to the intestines, suggests diverticulitis when there have been no previous symptoms of carcinoma, such as passage of mucus and blood. In the absence of symptoms which occur with cancer in these cases, one should expect to find diverticulitis. The patient with relapsing diverticulitis or chronic stenosing tumors should be given the best possible chance of cure by local removal of the disease in a one-stage or two-stage operation.

14. Since completing this paper, I have read the following articles with great interest and profit:
Drummond, H.: Sacculi of the Large Intestine, with Special Reference to Their Relations to the Blood-Vessels of the Bowel-Wall, Brit. Jour. Surg., 1917, **4**, 407-413.
Télling, W. H. M., and Gruner, O. C.: Acquired Diverticula, Diverticulitis, and Peridiverticulitis of the Large Intestine, Brit. Jour. Surg., 1917, **4**, 486-530.

# A SIMPLE METHOD OF AGGLUTINATION OF MENINGOCOCCI *

RUTH TUNNICLIFF, M.D.
CHICAGO

The following is a simple and rapid method for differentiating by agglutination the meningococcus from other gram-negative cocci grown from the nasopharynx of meningitis patients and contacts:

Equal parts of horse serum, normal or antimeningitic, whole human blood in sodium citrate solution (1 part to 2 parts of 2 per cent. sodium citrate in salt solution), and a suspension of organisms are incubated ten minutes, smeared on a glass slide, stained and examined microscopically. In the mixture with normal horse serum there is, as a rule, very little or no clumping of the meningococcus, while in the one containing antimeningitic serum there is decided agglutination. In the event that cultures of organisms, meningococci or otherwise, should be agglutinated in mixtures with normal horse serum, it would be necessary to use dilutions of the serum, normal as well as immune, in order to bring out the specific agglutinins of the immune serum.

In many cases, agglutination of the meningococcus occurs in the immune serum without the presence of human blood, but the blood gives a better staining specimen and appears to promote agglutination. This effect was observed first in the course of observations on opsonins in antimeningitic serum.

The suspensions of micrococci are made by adding one or two colonies from the original plate or a loopful of a subculture to 2 or 3 drops of physiologic sodium chlorid solution.

In making the tests, bent capillary pipets are used. First, a small quantity of serum, about 1 drop, is

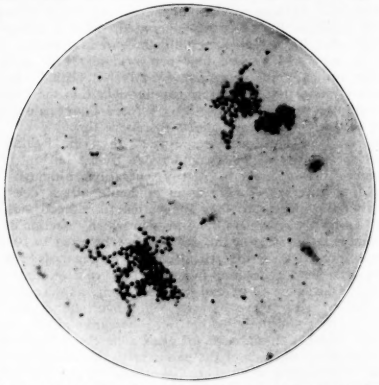

Fig. 1.—Agglutination of meningococci by specific serum as demonstrated by rapid method here described.

drawn in, the upper end of the column marked with a pencil, and then drawn up to admit an air bubble; next an equal amount of citrated blood is aspirated; when a sufficient number of pipets has been prepared in this way, the bacterial suspensions are made, and of each suspension the amount already indicated on the pipet is drawn into each of two pipets, one with normal horse serum and one with antimeningitic serum. Now the contents of the pipets are mixed in the bend, and after an incubation of ten minutes at 36 C. (or room temperature for twenty minutes), the contents are gently mixed again and blown out on a glass slide, spread with cigaret paper and, when dry, stained unfixed with carbolthionin, or fixed with heat and stained with methylene blue.

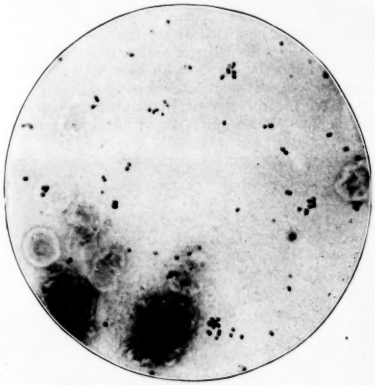

Fig. 2.—Absence of agglutination in control preparation with normal horse serum.

In this way about ten cultures can be examined in one hour, which is less time than it takes to make the macroscopic agglutination test. If the original colonies on the plates are separate, suspensions can be made with them and the organisms differentiated as early as sixteen hours or so after the original cultures have been made. If subcultures are used for the suspensions, the diagnosis is made twenty-four hours later; in any case, twenty-four hours may be saved, and often forty-eight, as compared with the macroscopic method.

One hundred and eighty cultures isolated by Dr. George Mathers from the nasopharynx of meningitis patients and contacts have been identified by this method. One hundred of them have also been examined by the macroscopic method of incubating twenty-four hours at 56 C., and whenever agglutination occurred by this method it also occurred in the tests made as here described. Four strains of meningococci were agglutinated microscopically but not macroscopically, probably owing to the higher dilution of the immune serum (1:50) in the macroscopic test. Forty of these cultures were from convalescent meningitis cases. Spontaneously agglutinable or inagglutinable strains of meningococci have not been encountered so far as I am aware. The other gram-negative micrococci in the cultures gave no agglutination, microscopically or macroscopically. The antimeningitis serum used was obtained from the Department of Health of New York City.

* From the Memorial Institute for Infectious Diseases.

**Pedagogic Celibacy.**—Not less than half a million women are potentially affected by the institution of pedagogical celibacy—an institution which is to be compared with that of sacerdotal celibacy in the amount of permanent harm that it is capable of doing to the race.—*Jour. Heredity*, June, 1917.

# THE TREATMENT OF DEFORMITIES OF THE SPINE CAUSED BY POLIOMYELITIS

## A REPORT OF EIGHT CASES IN WHICH FUSION OPERATIONS WERE PERFORMED *

RUSSELL A. HIBBS, M.D.
NEW YORK

Deformities which develop in consequence of permanent damage to the muscles of the spine from anterior poliomyelitis are among the most difficult with which the orthopedic surgeon has to deal, and I know of no means which can be depended on to prevent their progress. Plaster jackets and braces can, at best, only retard the development of deformity.

It has seemed to me practical, therefore, in such cases, to do a fusion operation on the spine exactly similar to that which has been used in the treatment of Pott's disease at the Orthopaedic Hospital since 1910.

It is my purpose to report eight cases in which this operation has been done for scoliosis. None of these patients were operated on until long after the acute attack, and obviously one would not operate at all if there were any prospect of recovery of the muscles affected. I do not think, however, it is at all necessary to wait as long as we have waited in these cases.

This operation is in every essential feature precisely the same as that performed on patients with Pott's disease. Since there seems to have been some misunderstanding of the technic of the operation, perhaps a description of it here will not be out of place.

An incision is made directly over the spinous processes through skin, subcutaneous tissue and ligament to the tips of the spinous processes. The periosteum over each tip and the ligament between is split. The periosteum is then elevated from the bone over a part of each process in turn. As the periosteum is separated from the bone, small packings of gauze are made to prevent oozing. Separation of the periosteum is carried forward gradually until each spinous process and lamina is completely bare to the base of the transverse process. This is done in children with a blunt periosteal elevator and in adults with a sharp one, as in the latter the periosteum is more adherent.

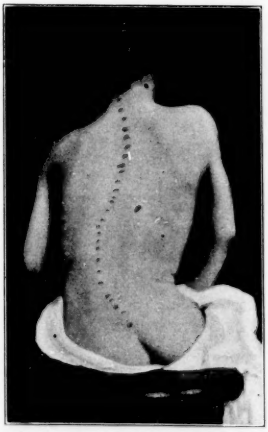

Fig. 1 (Case 1).—Condition before operation.

The periosteum is then pushed from the adjacent bases of the spinous processes and the adjacent edges of the laminae to the ventral side with a small curet or a periosteal elevator. With this dissection made, the operative field is ready for any treatment of the exposed bone that is desirable. The first thing to be done is to curet the lateral articulations which lie at the base of the transverse process and are always easily reached in children and in most adults. After this is accomplished, a small piece of bone is elevated from the laminae and turned down, its free end resting on the one next below it. The spinous processes are then partially divided, with forceps for that purpose, and broken down so that the tip of one comes in contact with the base next below it. This completes all that is necessary to do to the bone.

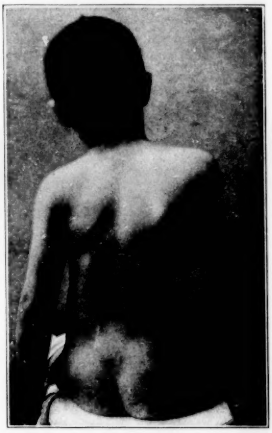

Fig. 2 (Case 1).—Condition after operation.

The periosteum and ligament which have been separated are then brought together and sutured in the center with interrupted ten day chromic catgut. The skin wound is closed with continuous ten day chromic catgut. Dressings and brace or jacket are applied.

The importance of cureting the lateral articulation is evident, as it insures a fusion of bone at that point. Turning a piece of bone down from one lamina across to the next below prevents any tissue from falling between the laminae, thus insuring their fusion, while the importance of the transposition of the spinous processes is obvious. With the closure of the periosteum in the center, we have practically a periosteal tube filled with fresh, healthy, bleeding bone in uninterrupted contact from one end of the operative field to the other, insuring a fusion of the lateral articulations, laminae and spinous processes.

Immediately after operation a brace or jacket is applied, maintaining as much correction as is comfortable to the patient. My own preference is a steel brace which has already been made and fitted before operation. The patient is kept in bed for eight weeks, and the brace is worn for one year.

In six of these cases there was conspicuous deformity, and such weakness in three, that the patients could not sit up unaided, much less walk. All of them have been given a much better posture, much more stability, and, it is believed, protection from a progressive increase of deformity and probably have been saved from the necessity of wearing a brace or jacket for indefinite periods.

I can see no possible disadvantage in fusing even longer segments of the spine than in these cases; in fact, I think in some it would have been better to make

* Read before the Section on Orthopedic Surgery at the Sixty-Eighth Annual Session of the American Medical Association, New York, June, 1917.

a longer fusion. If, as seems probable, such an operation can prevent these conspicuous deformities, it should be done in many of these cases and earlier, before such irreparable damage has taken place.

## REPORT OF CASES

CASE 1.—H. H., boy, aged 6, who had infantile paralysis at 11 months, was admitted to the hospital, June 20, 1914. There was loss of power in all muscles of the right thigh and leg; there was some power in the external rotators, abductors and external hamstring of the left leg, but very slight power in the calf and long flexors; there was complete loss of power

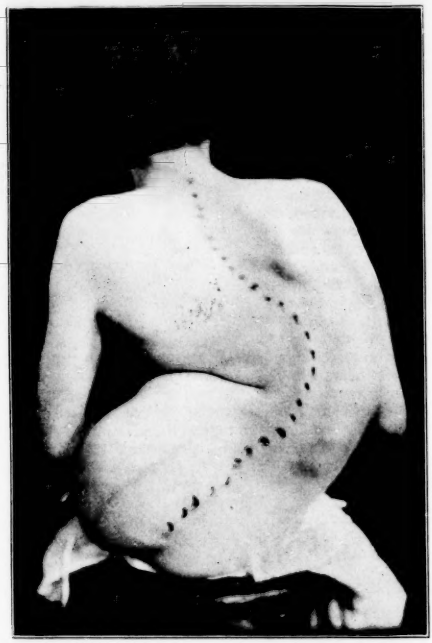

Fig. 3 (Case 2).—Position assumed by patient on attempting to sit.

in all the other muscles. Muscles in the right lumbar region of the spine were extensively involved, and there was a marked dorsolumbar curve to the right with marked rotation; the patient was unable to sit up at all without support. At the operation, June 23, 1914, a fusion was done from the tenth dorsal to the fourth lumbar vertebrae, both inclusive. The wound healed without complication, and there has taken place a fusion throughout the operative field, preventing any increase in deformity and increasing the stability of the spine so that sitting unaided is possible. Support was worn for one year afterward, and with braces applied to legs the patient is able to walk. Figure 1 shows the patient before operation and Figure 2 after operation.

CASE 2.—J. K., girl, aged 14, entered the hospital, April 27, 1915. She had infantile paralysis at 3½ years of age, both legs being extensively involved with conspicuous deformities and extensive involvement of the spine, permitting a right dorsolumbar curve with marked rotation. She had never been able to walk or sit up since paralysis. Figure 3 shows the position assumed by the patient on attempting to sit; even this was not possible without holding herself up by her hands. After correction of the leg deformities, a spine fusion was done, Nov. 3, 1915, extending from the eleventh dorsal to the fourth lumbar vertebrae, inclusive. Fusion is complete throughout the operative field, and she has capacity

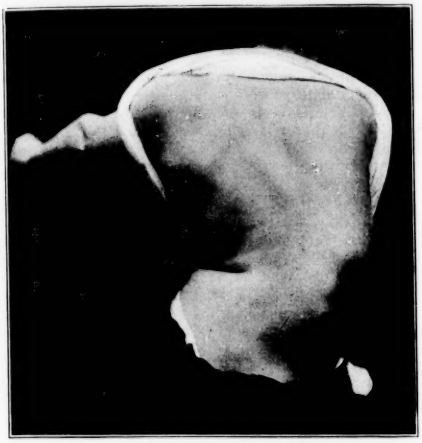

Fig. 4 (Case 2).—Condition one year after operation.

now to sit up without assistance and, while I do not believe a sufficient number of vertebrae were included in this case, at the same time the patient is immensely improved. Figure 4 was taken one year after operation; with braces on her legs, the patient is able to walk. She still wears a light steel support to her spine.

CASE 3.—C. R., boy, aged 14, had infantile paralysis at the age of 5, with extensive involvement of both legs and the spine and a dorsolumbar curve with convexity to the right and with marked rotation. January 19, a fusion operation was done from the ninth dorsal to the third lumbar, inclusive. Fusion is complete, progress of deformity stopped, and the stability of the spine much improved. Figure 5 was taken after operation. Photograph before operation was not obtainable.

Fig. 5 (Case 3).—Condition after operation.

CASE 4.—W. D., boy, aged 6, had infantile paralysis at 2 years of age, with extensive paralysis of both legs. The spinal group of muscles permitted a marked dorsolumbar curve to the right with rotation. The patient was admitted to the hospital, May 1, 1916. Fusion operation from the eighth dorsal to the third lumbar vertebrae, inclusive, was performed, May 19, 1916. Complete fusion was secured, with marked improvement; no progress of deformity

was detected. Figures 6 and 7 show the condition before and after operation.

CASE 5.—S. S., boy, aged 6½ years, had an attack of infantile paralysis at 4 years, leaving extensive paralysis of both legs and the spine. The patient never had walked or been able to sit up. The position when the patient attempted to sit up is shown in Figure 8, taken before operation. Deformities of the legs were corrected and a spine fusion done, July 6, 1916, from the sixth dorsal to the third lumbar. While there has been marked improvement, evidenced by the fact that the patient can now sit without support, and with braces on his legs is able to walk, it is possible that a more extensive fusion might have been better. However, there can be no question that progress of the deformity has been checked, and improvement is marked. In such a case, of course, operation should have been performed long before such conspicuous deformity developed. Figure 9 was taken after operation.

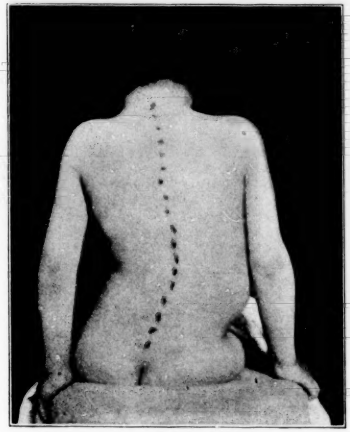

Fig. 6 (Case 4).—Condition before operation.

Fig. 7 (Case 4).—Condition after operation.

CASE 6.—J. D., boy, aged 16, had infantile paralysis at 1 year with complete paralysis of one leg, with the left spinal group affected, permitting a marked dorsolumbar curve to the left with rotation. The patient was unable to sit without assistance. Spine fusion was performed, Dec. 13, 1916, from the tenth dorsal to the third lumbar. Marked improvement in both position and stability of spine followed. In this patient, also, a spinal fusion should have been done earlier in life. Figures 10 and 11 show the condition before and after operation, respectively.

CASE 7.—F. D., boy, aged 9, had infantile paralysis at 4 years, leaving an extensive paralysis of the right leg and right spinal group, permitting a dorsolumbar curve to the right with marked rotation. Spinal fusion from the seventh dorsal to the fourth lumbar was performed, July 18, 1916. Complete fusion was obtained and improvement was marked. Figures 12 and 13 show the condition before and after operation, respectively.

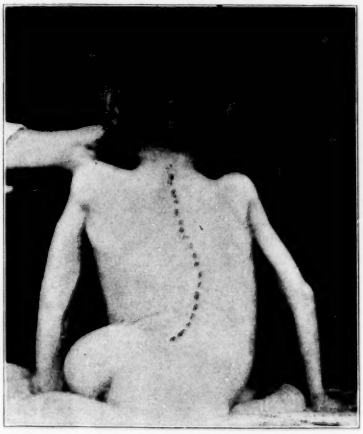

Fig. 8 (Case 5).—Position assumed by patient on attempting to sit.

Fig. 9 (Case 5).—Condition after operation.

CASE 8.—W. B., boy, aged 16, had infantile paralysis at 2 years of age. The right quadriceps, left anterior tibial and peroneal groups of muscles were affected, and also the right spinal group, permitting a right dorsolumbar curvature with marked rotation. Spine fusion was performed, Dec. 29, 1916, including the eighth dorsal to third lumbar. Fusion was complete and improvement in both positions and stability of spine resulted. Figures 14 and 15 show the condition before and after operation, respectively.

130 East Thirty-Sixth Street.

## ABSTRACT OF DISCUSSION

DR. EMIL S. GEIST, Minneapolis: How many vertebrae should be fixed?

DR. FRED J. FASSETT, Seattle: I think we all agree with Dr. Hibbs that it is bad for a patient to wear a body support longer than is necessary. We could go further and say that is difficult to find any form of body support which in a paralytic scoliosis, will do the work. I have done only the bone splinting operation. In such cases, even where the splint has firmly healed in place, it has not had the slightest effect on the curvature or the rotation. If any operation would control a paralytic scoliosis it would be one which produced a perfect mass of new bone about the processes. This is what the operation used by Dr. Hibbs appears to do.

DR. JOHN RIDLON, Chicago: I should like to have Dr. Hibbs say, if he will, why he did not make an effort to correct these spines before doing the fixative operation. These

spines can be considerably, and sometimes completely, corrected; but the problem is to hold them in the corrected position. His operation would seem to be the way of holding them there; but why not do the other thing first?

a substantial human tissue splint, and will in a way serve as a means of holding the trunk erect. If scar tissue will produce scoliosis, it is only fair to make it serve as a means of correcting it.

Fig. 10 (Case 6).—Condition before operation.

Fig. 11 (Case 6).—Condition after operation.

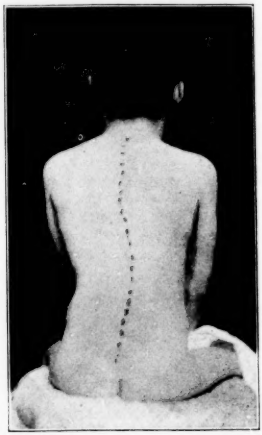

Fig. 12 (Case 7).—Condition before operation.

DR. HORACE R. ALLEN, Indianapolis: From time to time there come into our practice children and adults with horrible scolioses due to injury. I have had cases in which the patient had been burned, and the resulting cicatricial tissue would pull them over, and when the scar tissue was deep there was almost no way to get them straightened. I should

DR. JOHN RIDLON, Chicago: Some scar tissue stretches instead of contracting, and it is not very good procedure to try to straighten a scoliotic spine by putting scar tissue on the convex side.

DR. ALBERT H. FREIBERG, Cincinnati: I commend what seems to me an excellently conceived procedure for these

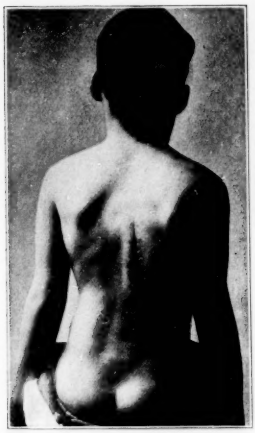

Fig. 13 (Case 7).—Condition after operation.

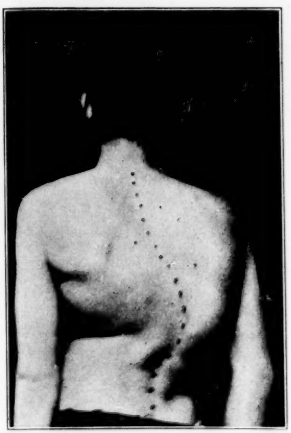

Fig. 14 (Case 8).—Condition before operation.

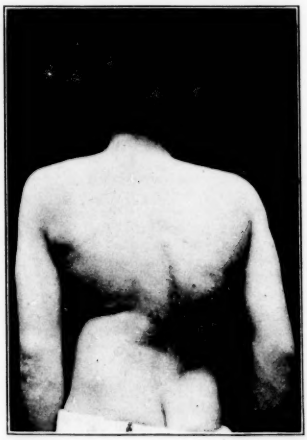

Fig. 15 (Case 8).—Condition after operation.

like Dr. Hibbs to say whether he thinks the artificial production of scar tissue on the convex side might not be of benefit by contracting and holding the spine straight. Scar tissue is inelastic, as every one knows, and if it is deep enough and properly located it will be strong enough to serve as

cases, and it seems to me, also, that it would be no mistake to operate in these cases earlier than has been done. I would regard this as the one exception that I might be willing to make to operating on paralytic deformities early. Whatever we may feel with regard to the relative merits of the bone

grafting operation and the operation of Dr. Hibbs for Pott's disease, it seems to me that this would be the operation of choice for paralytic scoliosis, because it attacks the deformity at the periphery of the curve, which is supposed to be the chief point of merit in any fusing operation for Pott's disease. There is a large question that Dr. Hibbs will have to decide for us, and that is whether the correction he obtains will endure. It seems to me that there is abundant reason to doubt that, since there is inequality of muscular action, which will persist, presumably, as long as the child lives. It is a question whether the response to muscular pull on one side, and absence of it on the other, will not eventually cause a yielding of the vertebrae and an increase of the deformity.

DR. E. D. EBRIGHT, Wichita, Kan.: For the class of cases shown, I think Dr. Hibbs' operation is a most important advance. Since last fall I have seen forty-two of these scolioses that, if they had been allowed to go on, would have become exactly the type of case represented by the worst picture shown by Dr. Hibbs. I think the necessity to do that operation, however, is a reproach to the medical profession, for these deformities can be prevented if the disease is taken in time and properly treated. As Dr. Freiberg says, the paralyses are equal on both sides, and the back is as liable to slump one way as the other. The fusion operation is much preferable to the splinting operation, which controls the spine in flexion and extension only, while this method stops side bending as well.

DR. WALTER TRUSLOW, Brooklyn: We have watched these cases this summer and have prevented the deformity, and we have seen the strength slowly come back under protection and carefully guided muscle training. Of course, we cannot yet know the ultimate result.

DR. JAMES W. SEVER, Boston: It is not a question of muscle training over a period of a year; it is a question of holding the corrected position in these cases by adequate apparatus over a period of ten or fifteen years. If one talks of holding them for six months or a year only, one has not the correct conception to base results on.

I was glad to hear what Dr. Ebright said, but I think that he is an optomist, especially with regard to correction of scoliosis due to infantile paralysis. If he knows of any method to prevent its increasing in infantile paralysis I should like to know it.

DR. RUSSELL A. HIBBS, New York: The question asked by Dr. Geist, as to how many vertebrae to fuse, I would answer by saying that it depends on the extent of the curve. In some it was only necessary to fuse five or six; and in others, as many as twelve, depending on the extent of the curve and the amount of paralysis. No one would contemplate doing the fusive operation on a child whose spine was only temporarily affected. We wait and see the amount of permanent damage done by the infection.

In answer to Dr. Freiberg's question as to the permanency of the correction of these deformities, I would say that a longer time must elapse before a definite answer can be given. My own feeling is that it may be permanent.

In answer to Dr. Ridlon's question as to whether corrective work is done before operation, it is, and should always be. I feel, however, that if a longer experience proves that a fusion operation will permanently prevent these deformities, it should be done earlier.

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**Imports of Senna.**—Only since the beginning of the war has senna become an article of export from Aden to the United States, according to Consul Addison E. Southard, at Aden (*Commerce Reports*, July 2, 1917). The first shipments were made in the second quarter of 1916 and amounted to 31,273 pounds. Smaller shipments were made during the third quarter of the year. In the second quarter of 1917 the shipments amounted to 82,868 pounds, valued at $42,407, ranking second in value of articles exported to the United States from Aden. The crude drug comes to Aden from the Yemen and other Red Sea Arabian provinces and the poorer grades from Abyssinia and French Somaliland. At Aden it is cleaned before export, Indian women being employed to pick it over and throw out twigs, discolored leaves, etc.

## REPORT OF AN OUTBREAK OF DIPHTHERIC WOUND INFECTION AMONG RETURNED SOLDIERS

J. G. FITZGERALD, M.B.
Major, Canadian Army Medical Corps; Associate Professor of Hygiene, University of Toronto, Faculty of Medicine

AND

D. E. ROBERTSON, M.B.
Major, Canadian Army Medical Corps; Assistant in Surgery, University of Toronto, Faculty of Medicine

TORONTO

We have been unable to find, in the literature accessible to us, references to epidemic outbreaks of wound infection due to *Bacillus diphtheriae*. The cases which have come under our observation during the past six weeks have therefore been of considerable interest.

For some months, wounded men of the Canadian Expeditionary Force on whom amputations of arms or legs or both were necessary have been returned to Toronto for further orthopedic treatment. Such patients were under the care of the Military Hospitals

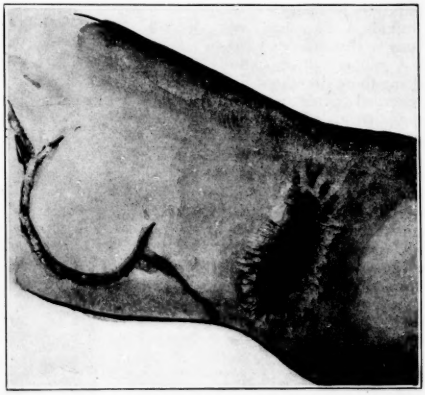

Fig. 1.—Diphtheric infection of inner side of left leg. The sinus is sunk (all around outside edge) below the normal level of the skin. The sinus (inside) is about one-eighth inch deep from its outside edge. Swelling is prominent.

Commission Command, "D" Unit, to which one of us (D. E. R.) is attached for duty.

During the first week in May, 1917, as a result of a thorough examination of suppurating stump wounds, one or two cases were observed which strongly suggested diphtheric infection. One of us (D. E. R.) made a clinical diagnosis of skin diphtheria, ordered a bacteriologic examination, had the man isolated, and diphtheria antitoxin was administered.

May 19, 1917, this man (who belonged to an infantry battalion) was admitted to the isolation department of the military base hospital, Toronto, suffering from a diphtheric infection of a leg stump. The patient had a reamputation of the leg, March 31, 1917. For some time his stump did very well. About May 11 his stump showed signs of infection, and a bacteriologic examination revealed that the infection was due to *B. diphtheriae*. As soon as the patient was admitted to the base hospital, one of us (J. G. F.) as Sanitary Officer No. 2 in Military District No. 2,

commenced a thorough investigation of all infected wounds, stump or other, in returned men of the Canadian Expeditionary Force who were in hospital or were outpatients at any of the military convalescent hospitals in Military Division No. 2. Further, nose and throat swabs were taken from all of these patients and from all other contacts, including the personnel, medical officers, nursing sisters and men.

Between May 20 and June 7, 1917, sixty-seven men with suppurating wounds, chiefly amputation wounds, were swabbed. Of this number thirty-two were found to be suffering from *B. diphtheriae* infection. In addition to these wounded men who were so infected, a nursing sister with a slight wound of one index finger was also discovered to be suffering from diphtheric infection of the finger. A careful investigation revealed the fact that this nursing sister had been doing the dressings of men who were suffering from suppurating amputation wounds. She had not been in the habit of wearing rubber gloves while doing these dressings. She observed after a short time that a slight abrasion on her finger became infected. It was learned that among others she had dressed the wounds of the first cases of this condition which were discovered. When she was assigned to duty in the hospital in which these patients were being treated she was not infected. Shortly after commencing the work she became infected, and was undoubtedly infected by one of the men whose wounds she was dressing. It was at first strongly suspected that she was responsible for the outbreak. Very soon, however, patients were found whose wounds had never been dressed by the nursing sister in question and who had, as a matter of fact, been returned to Canada after this nursing sister was sent to the isolation department of the base hospital. Two or three cases were discovered in men immediately on their arrival in Toronto from overseas, and they gave a history of having had suppurating wounds for some time before returning to Canada.

It was extremely probable, therefore, that patients with diphtheric wound infection were being returned to Canada from overseas. Since a routine bacteriologic investigation of all cases of suppurating wounds had not been made, it was impossible to learn who was the original source of infection.

Fig. 2.—Staphylococcus pyogenes aureus infection; shrapnel wounds of right leg above ankle. The small sinus to the left is about one-eighth inch deep; the large sinus is about one-sixteenth inch deep.

Of the first twenty patients investigated, several had been in Canada for some time. It seemed possible that in some of these cases infection may have been transferred from one man to another, or in certain instances acquired while the men were on pass. We have been informed also that some of the men removed their dressings while they were out on pass to show the stumps to friends. Infection might, of course, have taken place under such circumstances while the men were away from the hospital.

Since it has been observed that possibly 1 or 2 per cent. of normal healthy persons are carriers of *B. diphtheriae* it was a matter of interest that as a result of the bacteriologic examination of the nose and throat swabs of all the patients examined and of the contacts only two carriers were found. One of these men was a healthy carrier, the other was a man with a large infected wound of a leg stump which infection was due to *B. diphtheriae*, and he had probably transferred the infecting microorganism from his leg stump to his nasal mucous membrane. Forty-three suppurating amputation wounds were found to be infected with other microorganisms, chiefly *Staphylococcus pyogenes-aureus*. Of the men with wounds infected with *B. diphtheriae*, six at least had what looked like diphtheric membranes, and clinically they somewhat suggested diphtheria because of the toxic symptoms, which, however, were much less marked than in the ordinary clinical types of diphtheria. Not a single clinical case of diphtheria with infection of the mucous membrane of the mouth, nose or throat was observed in this outbreak.

The six men who had most marked symptoms suggesting skin diphtheria all improved greatly after antitoxin was given. The first man so treated noted the greatest improvement in his stump within forty-eight hours after antitoxin was administered. The pain and swelling and brawny induration were less evident.

One of the most important points from the clinical aspect is that an infection due to *Staphylococcus pyogenes-aureus* may so closely resemble infection due to *B. diphtheriae* that without a bacteriologic examination the nature of the infection cannot be determined. This is illustrated in the wash drawings which have been made of a case of wound infection due to *B. diphtheriae*, and of another caused by *Staphylococcus*

*pyogenes-aureus*. Clinically they presented almost exactly the same appearances.

The types of *B. diphtheriae* found in cultures of some of these cases are shown in the photomicrograph. Granular forms were found in a number of cases; these organisms grew well on blood serum, and on this medium showed the typical morphology. They did not grow on ordinary lemco agar. In one or two instances, organisms which grew as granular types on blood serum appeared as solid forms on agar.

The wounds in which the infection was due to *B. diphtheriae* invariably began to clear up when antitoxin was administered, as was done in all cases. Such cases had shown no improvement whatever when an acid solution of hypochlorite (Lorain Smith), etc., was used alone. As soon as the body fluids became strongly antitoxic, improvement was noted. Experiments to determine the virulence of seven of the strains of *B. diphtheriae* causing these infections have been undertaken.

From the culture isolated in the case of P. E., a man suffering from an infected gunshot wound of the upper forearm, a toxin was produced, which in a dose of 0.5 c.c. killed a guinea-pig weighing 250 gm. in thirty-six hours. Another guinea-pig of the same weight was given a similar dose of this toxin, and in addition 1,000 units of antitoxin. The second guinea-pig was kept under observation for two weeks; it gained in weight and showed no paralyses. Several other strains tested showed somewhat less virulence.

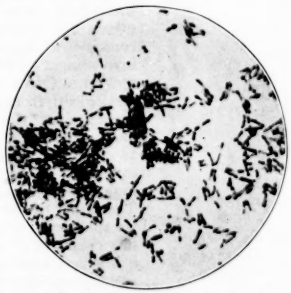

Fig. 3.—Culture of B. diphtheriae isolated in Patient P. E.: granular types especially numerous.

The length of time required to clear up these infections varied considerably. One patient gave two successive negative cultures one week and a half after his infection was first determined, and he was given appropriate treatment. Twenty-three of the twenty-eight patients first observed had two successive negative cultures and were discharged from hospital in six and one half weeks or less. The average stay in isolation of these first twenty-three patients was thirty days. Five of the original twenty-eight patients still gave positive cultures more than six weeks after the nature of the infection was ascertained.

The treatment in all cases was practically the same. The men were isolated, were given diphtheria antitoxin, and their dressings were done with a rigid regard for asepsis. It has also been recommended that in future a routine bacteriologic examination of all suppurating wounds be made; also, that in no case should dressings of infected wounds be undertaken without rubber gloves being worn. It is regretted that because of the pressure of other work a Schick reaction could not have been done on all these cases.

**Responsibility of Medical Staff.**—The commanding officer of today, who is wise, instinctively acts according to the sentiment of Gen. Winfield Scott: "I am in the habit, myself, when on duty with troops, of paying great deference, and even of yielding my opinion, on matters deeply affecting health and life, to the advice of my medical staff."—Lieut.-Col. C. C. McCulloch, Jr., U. S. Army: The Scientific and Administrative Achievement of the Medical Corps of the United States Army, *The Scientific Monthly*.

## CONICAL CORNEA, OR ANTERIOR MYOPIA *

EDWARD JACKSON, M.D.
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This subject, last brought before the section in the valuable symposium by Burnett, Sattler and Hermann Knapp, seventeen years ago, is of great scientific and practical interest, and our knowledge of it is still fragmentary. It has broad relations with other pathologic conditions of the eye and with more general problems of nutrition. The phrase "anterior myopia" is suggestive of relations to the larger class of posterior myopia and the process through which the great majority of cases of myopia develop. Both keratoconus and posterior or axial myopia arise from the pathologic distention of the sclerocorneal coat. In their production, states of general nutrition and local conditions both share, but to quite different extents. Axial myopia has been the subject of extended and thoughtful study, especially by our colleague, Dr. S. D. Risley. The succession of events, eye-strain, uveal congestion, scleral softening and distention, and passage of refraction from hyperopia to myopia have been often watched. Especially has astigma been noted, as an important factor in the production of eye-strain; the eyes passing, as Risley has phrased it, "from hyperopia to myopia through the turnstile of astigmatism."

The use of the eyes for near work is also recognized as a very general condition of the causation and progress of myopia. General diathetic diseases have also been considered to cause myopia. Batten[1] made a strong argument for the connection of myopia with general disease, and reported seventeen cases in support of this view, mostly of myopia arising in connection with cardiovascular disease. The share of general impaired nutrition in causing myopia has not been so well demonstrated as the share of near eye work and strain from astigmia, but it seems necessary to assume such a factor to account for the fact that in many patients astigmia, eye-strain and retinochoroidal hyperemia leave undiminished hyperopia, while others become less hyperopic or myopic.

In the production of keratoconus the same factors may be concerned, but with far different relative importance. In anterior myopia, conditions of lowered general nutrition seem to be of first significance; anemia, acute general disease, chronic diathetic diseases, and impaired nutrition from many causes seem clearly associated with the beginnings of conical cornea. These may from the first cooperate with eye-strain, and later certain mechanical factors perpetuate and increase the trouble; but conical cornea rarely, if ever, begins when the patient is in robust general health. It is easy to see why the nonvascular cornea should especially suffer from lowered nutrition; while the most vascular portion of the sclera at the posterior

* Read before the Section on Ophthalmology at the Sixty-Eighth Annual Session of the American Medical Association, New York, June, 1917.

1. Batten: Ophth. Rev., 1892, p. 1.

pole of the eye should be most involved in a process, marked by active hyperemia. In axial myopia the brunt of the pathologic process falls near the posterior pole of the eye and near to the temporal side of the optic disk. The influences that produce keratoconus show little or no effect except toward the center of the cornea well removed from the vascular limbus. The beginnings of keratoconus are not closely associated with near work for the eyes, although after the defect has come into existence, and the eye is crippled for distant vision, the same vicious circle is established as in axial myopia; and the deterioration is

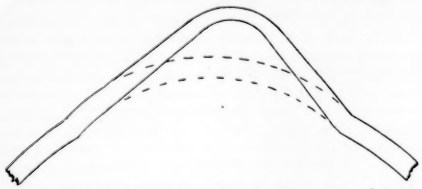

Fig. 1.—Diagram representing bulging of conical cornea of 2 mm. with thinning of apex.

likely to be more rapid and to go much farther because of the presence in keratoconus of high and variable astigmia.

The conditions under which keratoconus begins are often difficult to determine. But in all cases that I have investigated carefully in this respect there has been a clear history of some antecedent severe impairment of nutrition.

One patient had suffered from extreme epistaxis; another from many attacks of epistaxis resulting in anemia; another had suffered from marked anemia from other causes, and three others first noticed defective vision while recovering from typhoid fever. One began after a severe attack of pleurisy. Others traced the beginning of the trouble clearly to scarlet fever and measles, although no history of special ocular inflammation at the time could be obtained, and there was no evidence of keratitis. A woman of 40 came out of two years of invalidism with astigmia of 5 and 6 D. incapable of perfect correction, although there was no evidence that her sight had been defective before that. A poorly nourished girl rapidly developed conical cornea at puberty.

This importance of generally depressed nutrition in causing keratoconus is also illustrated in the fact that most cases are bilateral, thirty-one out of forty-eight. Of the remaining seventeen, one patient had lost one eye probably from conical cornea, and the operations done for it; and in six others there was evidence that the eye, which was not counted as having conical cornea, had at one time been disturbed by the same process, but had soon regained a nutritive equilibrium retaining good vision with moderate astigmia. That is, of forty-eight cases, thirty-eight were really in the beginning instances of binocular disturbance. The importance of impairment of general nutrition in causing keratoconus seems certain.

### THE MECHANISM OF KERATOCONUS

Plaut[2] reported a case of conical cornea in which the affected part of the cornea was greatly thickened, and experimentally produced in rabbits a condition resembling conical cornea in which the membrane was greatly thickened. But the great mass of evidence indicates that thinning as well as softening of the tissue occurs so that it yields before normal or even diminished intra-ocular pressure.

Salzmann[3] reports examination of a keratoconic eye in which the thinnest part of the cornea, the apex of the cone, was 0.17 mm. in thickness, one-fourth or one-fifth the normal. He cites seven other reports of similar observations in which the apex of the cornea was found thinned to one-half or one-third the normal thickness. The ease with which the highly conical cornea can be indented by the lid margin, or altered in shape by lid pressure, makes it certain that the essential change in keratoconus includes thinning of the cornea with distention.

The actual protrusion in a case of conical cornea is generally much less than commonly occurs in posterior myopia. A protrusion of 1 mm. makes a very marked conicity. My notes show no case of protrusion of the cornea of over 2 mm. Yet that lengthening of the anteroposterior axis of the eyeball would cause only 6 D. of myopia. Anterior myopia is to no important extent axial. It is preeminently myopia of curvature (Fig. 1). The protrusion rarely involves the whole cornea. It often affects little more than one-half the area. In a few chronic cases of gradual development the whole cornea is altered in shape, and in some others the protrusion blends so gradually into the conicity of the cornea that the appearance suggests involvement of the whole cornea in the pathologic distention. Often the pathologic bulging is distinctly marked off from the normal corneal curve. Generally the apex of the cone is situated below and to the nasal side of the center of the cornea, often as much as 2 or 3 mm. from the center. I have never noted it exactly at the center. This eccentric bulging gives the high astigmia that marks all cases of keratoconus. The center of the protrusion may present a fairly regular spherical curve, although usually it does not. But this center is so small that the light admitted through it is a very small proportion of that entering the pupil; and it may be so enormously myopic as to be far beyond the limits of correcting glasses or any possible usefulness in vision.

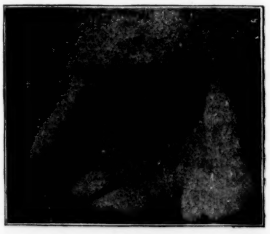

Fig. 2.—Corneal curvature modified by lid pressure produced by traction with tip of finger near the outer canthus.

### ASTIGMIA

Generally the apex of the cone does not come in front of the contracted pupil. The patient is compelled to see through one side of the cone and so has to contend with high astigmia. In the direction of a line radiating from the apex of the cone, the cornea is relatively or actually flattened. In a direction at right angles to this, the tangent of a circle having the apex as a center, the curvature is progressively increased as the apex is approached. Thus arises the high regular astigmia which with irregular astigmia characterizes the refraction of conical cornea. Of forty-five cases of keratoconus given optical correction, all had marked astigmia. The amounts of

2. Plaut: Klin. Monatsbl. f. Augenh., February, 1900, p. 65.

3. Salzmann: Arch. f. Ophth. (Graefe's), **67**, 1.

regular astigmia noted in these seventy-nine keratoconic eyes are given in the accompanying table.

Almost as characteristic as the high degree of regular astigmia is its variability from day to day, or test to test, under variations of light; and its tendency to change from year to year, in amount, and to a less degree in direction. The astigmia as indicated by the glass preferred also varies greatly from the curvatures of the corneal meridians as shown by the ophthalmometer. Take the following case under observation thirteen years, while passing through college, medical school and hospital internship:

AMOUNTS OF REGULAR ASTIGMIA IN SEVENTY-NINE KERATOCONIC EYES

| Diopters of Astigmia | Number of Eyes |
|---|---|
| From 1 to 2 | 1 |
| From 2 to 3 | 1 |
| From 3 to 4 | 11 |
| From 4 to 5 | 13 |
| From 5 to 6 | 24 |
| From 6 to 7 | 10 |
| From 7 to 8 | 7 |
| From 8 to 9 | 7 |
| 9 | 1 |
| 10 | 2 |
| 14 | 1 |
| 21 | 1 |
| Total | 79 |

CASE 1.—L. G. W., aged 19 when first seen.
Nov. 6, 1903:
Right, Ophthalmometer + 4. cy. axis 120°
Lens — 3.50 Sph. ⊃ + 2.50 cy. axis 153°
Left, Ophthalmometer + 3.50 cy. axis 60°
Lens — 5. ⊃ + 3. cy. axis 10°
Dec. 26, 1908:
Right, Ophthalmometer + 4. cy. axis 140°
Lens — 3.25 ⊃ + 0.75 cy. axis 160°
Left, Ophthalmometer + 4. cy. axis 65°
Lens — 4.50 + 2. cy. axis 5°
Aug. 29, 1910:
Right, Ophthalmometer — 4.50 cy. axis 130°
Lens — 3.75 ⊃ + 3. cy. axis 170°
Left, Ophthalmometer + 4.45 cy. axis 60°
Lens — 4.50 ⊃ + 2. cy axis 5°
Feb. 28, 1914: This patient's refraction changed with the use of pilocarpin.
Right, without: — 3.75 cy. axis 86° = 5/10 partly
With pilocarpin: — 0.50 ⊃ — 3.50 cy. axis 110° = 5/5 mostly
Left without: — 5.50 ⊃ + 3.75 axis 5° = 5/5 partly
With pilocarpin: —5.50 ⊃ + 3.75 axis 5° = 5/5 mostly
March 2, 1914: Without pilocarpin:
Right — 0.50 ⊃ — 3. cy. axis 95° = 5/12 partly
Left — 5.50 ⊃ + 3.50 cy. axis 5° = 5/5 mostly
March 6, 1914:
Right — 2.75 cy. axis 95° = 5/5 mostly
Left — 5. ⊃ + 3.25 cy. axis 180° = 5/5 mostly.
July 3, 1916: The eyes now became less variable and still required:
Right — 3. cy. axis 87°
Left — 5. cy. ⊃ + 3.25 cy. axis 180°

For reasons given below, the close correction of such astigmia, at least to the extent of securing the best vision, and the keeping of the correcting glasses closely adapted to the eye, is of great practical importance.

### EFFECTS OF LID PRESSURE

The effort to get the best vision is instinctive and persistent. It prompts the patient to try all sorts of experiments. The presbyope goes through the "trombone performance." The patient with uncorrected astigmia twists his head until he looks through his glasses obliquely in a way that makes them give the greatest assistance; the myope with too weak glasses looks through them obliquely to increase their strength, getting all the theoretical disadvantages of a full correction with some very important practical ones added. The myope without glasses partly closes his eyes, to lessen the circles of diffusion, thereby getting from the Greeks the name for his defect, which it retains today.

The patient with keratoconus, especially if it be largely myopic, is likely to resort to similar pressure to overcome, so far as possible, the disadvantageous curvature of the cornea. The long recognized "nipping" of the lids not only narrows circles of diffusion; it can also alter to a marked degree the corneal curvature, especially when the cornea is thinned and softened.

CASE 2.—Miss G. E. F., aged 34, could change the curvature of her cornea equivalent to 1 D. change of refraction without closing the lids enough to prevent watching the ophthalmometric images. The effect was always to diminish the curvature in the horizontal meridian and increase it in the vertical meridian. The latter, however, was neutralized by the stenopaic effect of narrowing the palpebral fissure. Her cylinders, which were

Right — 6.50 axis 120°
Left — 11. axis 120°

varied as much as 1 D. either way in frequently repeated tests, and as much as 15 degrees in the directions of the meridians chosen. The ophthalmometer reading indicated

Right — 5. cy. axis 80°
Left — 5.50 cy. axis 155°

at repeated observations.

Fig. 3.—Face of patient at rest. Note wrinkles about the eye of a man of 27.

Observations on other patients show that the usual effect of "nipping" the lids is that given above: to lessen the curvature in the direction of the palpebral fissure and increase it at right angles thereto, diminishing the myopia in the former and lessening the effect in the latter meridian. An unusual way of making such changes in the corneal curvatures is illustrated in the following case:

CASE 3.—A. M. H., a schoolgirl, aged 12, had the following vision and refraction:

Right 4/27 partly — 4. sph. ⊃ + 1. cy axis 95° = 4/4
Left 4/100 and with — 9. sph. = 4/20

While not wearing glasses, she found she could bring up her vision so that she could see the blackboard by dragging on the outer canthus and upper lid of her right eye with the tip of a finger, as shown in Figure 2. In this way she brought up vision to 4/7.5 partly.

This patient was seen regularly at intervals of from twelve to thirty months, and by the time she was 19 her myopia had increased 2 diopters.

CASE 4.—K. F., man, aged 27, in 1903, had scarlet fever when 14, and was sick for a year afterward, from which period he dated his poor sight, which had gradually increased. He

had high conical cornea. His corneas were almost clear, showing a very slight general haze, and the ocular fundus was normal. The ophthalmometer showed:

Right + 7. cy. axis 130°
Left + 10. cy. axis 80°

The following gave him the best vision:

Right + 5. sph. ⌒ — 8. cy. axis 75° = 1/5
Left — 6. cy. axis 80° = 1/40

He was not wearing glasses, having been unable to get any that helped him. Vision with either eye without lid tension was probably about 1/100, but the instant his attention was directed to the letters, a curious distortion of the whole face occurred with lid tension that brought his vision up to 1/20. The change is shown in Figures 3 and 4.

The apex of the cone was below the edge of the 4 mm. pupil in each eye, and the lower part of each pupil (half for the right and two-thirds for the left) was myopic. The upper part of each pupil was hyperopic. In his attempts to see (Fig. 4), the lower lid was pressed hard against the eyeball and stretched so that the edge of the lid went straight across the middle of the pupil. He was given correcting lenses, and warned of the importance of getting entirely out of the habit of compressing the eyeball with the lids.

At the end of eleven months he returned with corrected vision right 1/3 and left 1/10, and his corneas entirely clear. He had given up the habit of lid tension so completely that he could reproduce the effect very imperfectly and with special

Fig. 4.—Face distorted by strong contraction of orbicularis to improve vision by lid pressure on the cornea.

effort. It was eight years before he could come again wearing the same glasses, which now required change, and the left eye had developed high myopia with choroidal absorption.

Right + 4. sph. ⌒ — 8. cy. axis 72° = 1/5 partly
Left — 4. sph. ⌒ — 8. cy. axis 140° = 1/18

Since than I have not seen him, but have heard from him that the sight of his left eye "is almost gone, and the right eye is in bad shape."

The following case shows how even the posterior distention of axial myopia may not save the cornea from protrusion, or how the malnutrition and softening of the coats may involve both the posterior and the anterior pole.

Case 5.—B. G. M., girl, aged 15, a bright student devoted to music, and strenuous in all she undertook, but anemic and "nervous," was brought to me for her eyes, Sept. 21, 1916. She had been wearing glasses since 8 years old, and now required them strengthened to:

Right + 0.75 sph. ⌒ — 1.25 cy. axis 175° = 1/4 plus
Left + 0.62 sph. ⌒ — 1.25 cy. axis 5° = 1/4 plus

There was little choroidal disturbance, but the optic disks were red and slightly hazy. The ophthalmoscopic readings were:

Right + 1.50 cy. axis 90° added to 43.5 D.
Left + 2. cy. axis 90° added to 44. D

There was some conjunctival hyperemia, burning and itching, in addition to the headache for which she came. She was under my care for four months and left with all symptoms relieved. June 19, 1912, she returned, having been under good professional care in Chicago and elsewhere. The strenuous educational process had been supplemented by social engagements. The ophthalmometer now showed:

Right + 1.25 cy. axis 90° added to 44. D.
Left + 10. cy. axis 100° added to 49. D.

The left eye was clearly suffering from conical cornea. A — 10. cy. axis 10° gave it vision of 1/50.

She next came, Sept. 14, 1912. The ophthalmometer showed:

Left + 9.50 cy. added to 52. D.

Lens, Left + 3. sph. ⌒ — 16. cy. axis 145° = 1/15 partly.

No marked change in the right eye, but

Right + 0.62 sph. ⌒ — 1.12 cy. axis 168° = 1/5 partly.

Oct. 4, 1916, she came once more broken down in health, highly anemic, listless, hopeless, and almost blind. She had been under treatment by various oculists in other cities. There was a history of operations, corneal ulcers, and finally enucleation of the left eye. Vision in the right was less than 1/100; she was wearing a compress on it much of the time, and using eserin. It had suffered from an "ulcer" last winter. The ophthalmometer showed but little regular astigmia with a corneal curve of over 70 D., corneal radius about 5 mm. A — 30 D. sph. lens gave vision of 9/100. There was a nebula near the center of the cornea. The use of a bandage was almost stopped, being occasionally used for pain, the eserin was continued, and everything done to build up the general health of the patient.

Jan. 11, 1917, the eye felt better, and the iris was of good color and structure. The ophthalmometer showed:

+ 6 to + 8 cy. axis 80°, added to 60 or 65 D.

Hot bathing of the eye has been substituted entirely for the bandage. The eye feels worst in the morning. The patient is to keep the head elevated.

Cases 6 and 7.—F. B., aged 18, and his sister, aged 17, both came for conical cornea, with the history that every member of the family wore glasses. They were both students, the brother then in college. In all three eyes the area of protrusion was comparatively small and situated below the center. The brother's correction and vision was:

Right + 4.50 sph. ⌒ — 7. cy. axis 90° = 1/4 partly
Left + 4. sph. ⌒ — 7. cy. axis 100° = 1/15 partly

After eight years, the patient living on a ranch, these are:

Right + 3.50 sph. ⌒ — 7.50 cy. axis 90° = 1/5
Left — 5. sph. — 7.50 cy. axis 85° = 1/12

The sister had only the right eye affected. She had vision:

Right + 1. ⌒ — 4. cy. axis 38° = 1/2
Left + 1. sph. ⌒ — 0.25 cy. axis 90°

After four years she showed:

Right + 2. sph. ⌒ — 5. cy. axis 55° = 1/4 partly
Left + 1.75 sph. ⌒ — 0.37 cy. axis 65° = 1/4 plus

These patients have taken proper care of their eyes, although living about 200 miles away so that they could be seen only at long intervals. The same is true of the following case:

Case 8.—Jan. 29, 1910, S. J. G., aged 19, high school student, dated his poor sight to typhoid fever five years before. The eyes had not grown worse since. Both corneas were conical, the apex of each cone being fairly central, and the reflections of the rings of Placido's disk fairly circular. The centers of the pupils showed with the ophthalmoscope a myopia of 20 to 30 D., and the margins of the dilated pupils in the direction of the radii hyperopia of 15 to 20 D. The ocular fundus was normal in each eye, so far as could be determined. The patient was put on the regular use of pilocarpin. Lenses given:

Right — 15. sph. ⌒ — 8. cy. axis 20° = 1/20
Left — 10. sph. ⌒ — 5. cy. axis 20° = 1/30

He was seen six months later with vision: Right 1/50, left 1/12.

Sept. 12, 1914:

Right + 3. ⌒ — 6. cy. axis 25° = 5/15 partly
Left + 6. ⌒ — 1. cy. axis 180° = 9/15

Jan. 26, 1917: He comes several hundred miles to be seen once.

Right + 4. ⌒ — 6. cy. axis 25° = 9/15

Left shows keratitis, hazy with facet at apex of cornea 1 mm. in diameter, no staining with fluorescein. He has completed school and college, and is now teaching school. He has used the pilocarpin continuously, but has not used his glasses sometimes during summer vacations.

In this paper no attempt has been made to give any complete account of conical cornea or complete histories of any of the forty-eight cases on which it is based. All of these cases have shown marked conicity of the cornea in some projection, asymmetrical except in Case 8. None of them has shown any marked choroidal disease or atrophic crescent except Cases 1 and 2. In the series of cases from which the forty-eight were taken, there were thirty-nine cases of myopia with 3 D. or over of astigmia, and seventeen cases of hyperopia, with astigmia of 3 D. or over. None of the forty-eight patients, except Case 5, was subjected to operation, and all the worst cases have been included above.

The points to which attention is directed are:

1. Keratoconus arises from yielding of the cornea to intra-ocular pressure during a period of impaired nutrition, commonly due to general disease.

2. It gives rise to curvature ametropia, about which the ophthalmometer and the shadow test give little information of value for the selection of glasses.

3. The subjective tests with lenses give widely variable results; and a decision as to the best lens is reached only after many trials, under varied conditions influencing the pupil.

4. It is extremely important that glasses should give the best vision under the conditions under which they will be used without lid pressure, which is to be carefully avoided.

5. The treatment should include:

Every effort to build up and sustain nutrition.

The continuous use of a miotic in the worst cases, usually pilocarpin.

The avoidance of softening the cornea by any form of bandages.

Under proper care operative treatment will rarely be needed.

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## A NEW OPERATIVE METHOD FOR THE RELIEF OF ADVANCED CASES OF KERATOCONUS

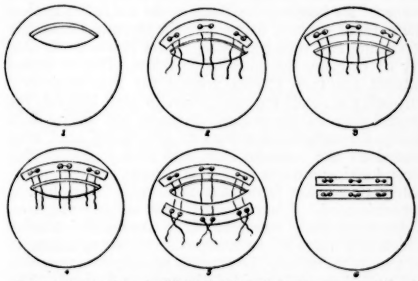
WITH REPORT OF TWO CASES *

MEYER WIENER, M.D.

ST. LOUIS

Conical cornea was observed by Demours as early as 1747, and has been described by many authors since that time. There has never been any satisfactory explanation as to its production or cause. It is known that it is more frequent in females than in males, and is generally first noticed between the twelfth and fourteenth years of life. The probability is that some disturbance of internal secretion is the most potent causative factor.

Many operations have been devised for the relief of this condition, none of which has given entirely satisfactory results. The earlier surgical attempts to relieve conical cornea were bent toward changing the refraction of the eye behind the cornea rather than to alter the cornea itself. In 1817, Sir William Adams advised breaking up of the crystalline lens by needling. Tyrrell suggested a still different procedure, that of performing a peripheral iridectomy, on the theory of there being less deformity toward the margin of the cornea than in the center, and consequently a peripheral pupil would be of advantage. Crichett modified this a little later by permitting the iris to prolapse, and tying a ligature around it, thus distorting the pupil. Frequent puncturing of the periphery of the cornea has also been resorted to for many years. Von Graefe suggested the greatest advance for the relief of this condition by proposing that the epithelial coat of the apex be shaved off and then cauterized with silver nitrate; finally the floor of the resulting ulcer was punctured, the object being to try to bring about scar contraction with resulting flattening. Bowman had previously excised a disk of corneal tissue from the apex with a trephine, but without any great success. A number of cases in which he excised an elliptical piece were reported by Bader. To prevent prolapse of the iris he passed horse-hair sutures through the cornea, previous to making the excision, afterward tying them over the edges of the wound. This operation has probably been the one most frequently advocated of those procedures which we might term purely surgical. The



Details of operation: 1. Elliptic incision of cornea near margin. 2. Gold strip with double-armed sutures already in place ready to be passed through peripheral margin of cut. 3. Sutures passed through peripheral margin of wound. 4. Sutures passed through central margin of wound. 5. Sutures passed through second gold strip. 6. Gold strips in place after completion of operation.

use of the electric cautery, or frequent punctures of the apex with a needle, being more simple and less dangerous, are the methods most often used today, when anything at all is advised. Recently a case of marked flattening has been reported from the use of the high frequency current applied to the apex of the cone.

The great objection to excision of the apex of the cone, or of a peripheral part of the cornea, has been the almost invariable prolapse of the iris into the wound with the sudden gush of aqueous, with its resulting infection, or irritation from an extensive leukoma adherens. The method which I am proposing is an excision of the corneal tissue in such a manner as to avoid iris prolapse. This I have succeeded in doing, and with fairly good visual results.

As the cornea near the apex of the cone is so thin as to preclude the probability of a successful dissection, I have elected to excise a segment near the periphery, as best suited to the method. The idea is to excise a segment of the cornea, including as nearly as possible its entire thickness, without puncturing Descemet's membrane, and then suture the wound. Necessarily there as an unusual tension on the stitches

* Read before the Section on Ophthalmology at the Sixty-Eighth Annual Session of the American Medical Association, New York, June, 1917.

which would cause them to tear through almost immediately unless some extraordinary means were employed. This difficulty is met by tying the sutures over thin gold plates, on the same principle as that employed in bringing together the gap in cleft palate. This method of suturing was described by me at the 1915 meeting of the Academy of Ophthalmology and Oto-Laryngology.

Gold strips 0.005 mm. in thickness and 1 mm. wide are used, with holes 1 mm. apart, and just large enough to permit the passage of the smallest curved eye needles. The length is cut according to the size of the wound to be sutured. An elliptic incision is made in the cornea near the limbus, with a small, sharp scalpel. The object is to go as deeply as possible without penetrating Descemet's membrane. The length is about 8 mm. and the width 3 mm.

The apex of the part to be excised is then picked up with a tiny sharp hook, and the resection carefully begun. The most important part of the dissection is to get a good start, as the apex of the ellipse can then be grasped with fixation forceps, and by putting the flap on the stretch, the layers of the cornea can easily be separated. This separation can be readily accomplished by following, with the point of the knife, the white line at the point of attachment of the flap to the cornea. By keeping the blade of the knife flat against the corneal surface, using only the tip, and alternately stretching and then separating, there is not much danger of entering the anterior chamber. Double armed sutures are then passed around the first gold strip through the small openings, then in turn through the central flap of the wound, through the limbus flap, finally through the openings of the second gold strip placed on the opposite side, and then tied over this second strip with one tie. The stitches are then alternately tied more firmly together until the wound is approximated. Linen threads are an advantage on account of their strength. The amount of tension which this form of suturing will withstand seems to be almost unlimited. If there is no infection they will not pull through, provided the technic is good. The technic is delicate and difficult, but can be acquired by any experienced operator with much practice and patience. It is essential that the bored holes shall be polished in order that the stitches may slide easily. I believe it to be an advantage purposely to puncture the anterior chamber at the periphery, away from the wound, after the sutures are all in place, and just before tightening and closing the wound, in order to permit easier approximation of the wound and facilitate healing with lessened tension. The plates are left in position, with comparatively little irritation, for eight or nine days. They are easily removed by simply cutting the loop over each gold plate, when the thread readily pulls through.

The following is a brief history of the patient on whose eyes this operation was performed:

M. S., girl, aged 15, first came to the Jewish Hospital dispensary for treatment, April 30, 1915. She had a very pronounced case of conical cornea in both eyes with ability to count figures at 7 feet with the right eye and $^{18}/_{100}$ with the left. Her refraction was carefully determined, but no improvement of any value could be secured, minus lenses making letters clearer, but not bringing up the visual acuity by measurement. She was put on epinephrin chlorid, 1:1,000, three times a day, as we had seemingly had some good results in mild cases of keratoconus and keratectasia with this treatment, as recommended by Pontius. It did not help, however, and, Feb. 23, 1916, she was admitted to the Jewish Hospital, and the right eye operated on two days later. March 6, the stitches and plates were removed, and, March 12, patient discharged from the hospital. There was considerable photophobia and conjunctival redness for many weeks after the operation, but these slowly subsided.

Sept. 12, 1916, visual acuity had reached $^{18}/_{100}$ in the right and fallen to fingers at 7 feet in the left. As the operated eye was considerably better than the left, or unoperated one, the patient begged to have the same thing done for the left.

She was admitted to the hospital, Oct. 9, 1916, and operated on, October 11. A segment was excised from the lower quadrant, as in the right eye. March 7, the stitches and plates were removed, and the patient discharged from the hospital, Oct. 29, 1916. November 28, the visual acuity was $^{18}/_{100}$ in the right and $^{18}/_{200}$ in the left. The visual acuity in the right has remained stationary, and in the left, March 8, 1917, had improved to $^{18}/_{75}$.

A peculiar phenomenon about this case is that while the patient asserts that a —4.0 D. S. to a —7.0 D. S. lens will improve each eye very much, she cannot be made to read farther. There is a linear scar on each cornea in the lower quadrant which can readily be demonstrated but which does not disfigure the patient and would not be noticed by a casual observer. I believe that there will be still further improvement with time, but if this should not develop, I shall advise excision of another segment. The patient is willing.

## ABSTRACT OF DISCUSSION

### ON PAPERS OF DRS. JACKSON AND WIENER

DR. SAMUEL D. RISLEY, Philadelphia: In the usual concept of axial myopia I believe we have been too prone to fix our attention solely on the pathologic changes at the posterior pole. The posterior staphylomas, the macular atrophies, etc., because of their grave significance, have claimed our attention to the exclusion of other features frequently manifested in increasing or changing refraction of the dioptric system. In a relatively large percentage of young people, especially young children, these changes in refraction occur without notable evidence of disease at the posterior pole. Given a case of congenital anomaly of refraction, with or without, but usually with, some associated abnormality of binocular balance, the act of vision cannot be exercised without abnormal effort or strain. Under this strain the vascular uveal tract becomes unduly congested, the intra-ocular tension rises, the circulation of the nutritive fluids is impeded and the nutrition of the globe impaired. The relatively soft or tender sclera of childhood yields to the increased intra-ocular pressure and stretches or distends, whereas the tough and therefore resisting sclerotic of middle life fails to give way and we have the phenomena of so-called glaucoma.

We need find no difficulty in regarding the resulting impaired nutrition of the cornea as an important factor in the changed curvature of the cornea, the shifting meridians, etc., which we so often are compelled to observe, or that in extreme cases the result may be conical cornea, or what I have frequently seen—a wave-like curve of that membrane instead of a demonstrable cone-like distention forward. I quite agree with Dr. Jackson that these conditions are prone to occur in people in impaired health, or in fat, flabby patients without resisting power, or in the underfed or sick.

DR. E. C. ELLETT, Memphis, Tenn.: I regret that I have had no experience with Dr. Wiener's treatment of conical cornea, and must therefore limit what I have to say to the technic of this method of corneal suture, based on animal experiment exclusively. This experience has impressed me with the difficulties of the procedure, to which I well refer under a number of heads.

1. Illumination: It is essential to have perfect illumination, preferably by a photophore or some other form of portable electric light.

2. It was not possible for me to do this work without the magnification secured by some form of binocular loupe.

3. The knife, preferably a scalpel, must be perfect.

4. It is necessary that the two cuts outlining the portion to be removed should penetrate the cornea to the same depth. This requires care and experience.

5. The removal of the portion included between the incisions is not especially difficult if the above precautions are observed.

6. The difficulty of handling several sutures and two rather long plates without tangling things up is very great, and if one suture breaks in tying, it will greatly try the patience of all concerned.

7. The last objection can be to some extent overcome by using a short plate, 3 mm. in length, drilled with two holes to accommodate a single double armed suture.

8. It would be still simpler to dispense with the plates, and pass each needle in and out along one edge of the incision, having the loop cross the incision at one end and the two free ends tied across the other end. For this purpose, as well as for use with the suture plates, the needles and thread suggested by Kalt for corneal suture are most satisfactory. The needles are round, not cutting, and make a wound which does not so readily cut out, although more difficult to push through the tissues than a cutting point.

9. By slightly undermining the edges approximation is made easier; but I am not sure that it would not make infection more probable.

One is surprised, in doing this and other work involving dissection or suturing of the cornea, to note the toughness of the membrane. It seems quite as capable of holding sutures as is the sclera.

DR. WILLIAM H. WILDER, Chicago: The question of the causation of keratoconus is an interesting one. It seems to me that the idea of a lack in general nutrition is not a sufficient explanation, for this condition of the eye is so infrequent, even in persons whose general nutrition is impaired, and is seen in persons apparently in good health.

I have always entertained the thought that there must be some anatomic peculiarity, possibly congenital, to account for the progressive thinning and subsequent bulging of the cornea. That there is an actual anatomic change even at an early stage of the process is evidenced by the fact that the nerves seem to have suffered and there is a distinct lack of sensitiveness in the most prominent part of the cone. Even before there is much bulging, this may be demonstrated by touching the tip of the conus with a probe, when it will be found to be quite insensitive. Later when the cornea becomes thinner, one may observe a pulsation of the tip, shown by a slight movement of the reflected images of the mires of the ophthalmometer as pointed out by Axenfeld and others.

In advanced cases, with vision greatly impaired, it seems to me we are justified in resorting to operative procedures in an attempt to check the bulging or to improve the sight.

A method I have used in several cases with benefit is the following: With a galvanocautery tip heated to a cherry red, four small incisions are made in the cornea from the limbus to within 2 or 3 mm. of the tip of the conus, at points on the cornea corresponding to 12, 3, 6, and 9 on a clock dial. These burns should extend through Bowman's membrane and widen out slightly as they approach the limbus. The resulting contracting scars have a tendency to flatten out the central portion of the cornea which remains clear. A somewhat similar method has been proposed by Dr. Posey, who makes only one such radiating incision. Care must be taken not to penetrate the cornea. In the patients treated there was distinct improvement of vision, and the method does not interfere with any subsequent procedure that one may have to practice.

DR. EDMOND E. BLAAUW, Buffalo: How is it that Dr. Jackson in a short time sees forty-five cases, and in other regions, at least in Buffalo, I have not been able to see forty-five cases in twenty years? There may be something in the region in which we live. In Germany, too. How can you make a diagnosis with this slight amount of astigmatism? I would like to ask Dr. Jackson how often he found the hemosiderin ring? We should always keep in mind that we have in many instances a self-limiting disease. I have seen many cases stop without apparent reason and nothing done in the way of operation. In the cases of keratoconus we have most probably a form of hyaline infiltration of the substantia propria. It occurs to me that we have to deal with a condition similar to nodular opacity of the cornea, often overlooked because it needs a great deal of research. I have seen fluorescein sometimes bring out opacities in the cornea before the binocular loupe. Uhthoff has recorded the microscopic findings in conical cornea with hyaline infiltration.

Now, if it is so important that lid pressure should be eliminated, are we not warranted in doing a canthoplasty? We can always resort to stitching up the defect. I have seen the pulsation. That is exceptional. Dr. F. Park Lewis showed me such a case. In my opinion it is rare. When must we operate? That is the great thing for us to know.

DR. HUNTER H. TURNER, Pittsburgh: Drs. Jackson and Risley have both mentioned features leading up to a certain element which in my experience has been of paramount importance in the production of this condition. Skillern, who is recognized as an authority on diseases of the accessory nasal sinuses, says that infection of these cavities following the diseases mentioned by Dr. Jackson is very common, much more so than is ordinarily believed, and that the primary infection is followed by a secondary infection of chronic character which persists indefinitely. He claims that the resulting tissue hyperplasia constitutes a point of lessened resistance which is affected by constitutional toxemias, and that the local effect is manifested by a turgescence of the nasal tissues. I wish to go on record before this section as stating that this nasal turgescence is always associated with a turgescence of the vessels of the retina and conjunctiva, with a tendency to increase in intra-ocular tension. I have had quite a number of cases of conical cornea in the early stages under treatment for years, which have remained stationary, the principal treatment being directed to the controlling of the sinus condition by competent rhinologists, and care in the matter of diet. This tendency to congestion and hypertension, in my experience, is present in every case of progressive change in the ocular dioptrics toward the myopic side.

DR. L. WEBSTER FOX, Philadelphia: I consider conical cornea one of the most mysterious of all eye diseases. You who have read the classical work of Nottingham on conical cornea—a book of 200 pages—know that he has thoroughly covered the ground of operations devised and abandoned. Many of these operations were autoplasty, or various cuts and incisions made in the cornea to try to reduce the nipple-shaped projection, if possible. All of these experiments have been carried out by me—varied incisions and sutures. A suture through the cornea is not half as disastrous as it appears, for the cornea has great resisting forces. You will remember the old Critchett operation for staphyloma—incision and suture—from which no deleterious results followed.

I am greatly interested in this operation of Dr. Wiener's, but I have come back to the English method—the application by the cautery. At present I have two patients in the hospital who have been operated on within the last ten days, and in both cases I used this method. One operation may not be sufficient; in that case a second one may be carried out. As I have said above, Morton's method and also that of Critchett have been my favorites. In following the cautery method I have obtained a deep saucer depression, and the final act is to pierce the center so that the aqueous will escape; in this way I have obtained good results. This mode of procedure makes a central scar. After performing the operation as outlined, an iridectomy is the next step, and after all inflammation has been allayed, a tattooing of the scar. A workable eye is thus obtained. Under the best conditions the chances are that one operation will not bring about the desired results. I have repeated the operation three times in one case, and finally, from about $\frac{5}{200}$ vision, got $\frac{20}{50}$.

Fario, an Italian surgeon, cut out a small portion of the cornea three different times, leaving a hole through which

the aqueous humor gradually drained. The first excision was practiced at the upper part of the cornea, the second at the lower, and the third at the upper and inner. Each piece of the cornea removed was triangular in shape, the apex being near the scleral margin.

Dr. Wiener's method is worthy of our consideration, but I am afraid his difficult surgical technic will not take the place of the actual cautery. However, I shall give it a trial.

Dr. Edgar S. Thomson, New York: I should like to say a word in connection with Dr. Wiener's operation. I have done six or seven conical cornea operations, excising the summit of the cone. It seems to me the results were better than cauterization because of less scarring. In one instance I did not excise a large piece of the cone, but the sutures pulled through on the third day. They were deep. There seemed to be an unusual amount of traction on the cornea. I had difficulty in keeping the lips of the wound together. The eye was finally practically lost. I do not know that that is a very common accident. It seems to me Dr. Wiener's operation would keep the lips of the wound in close apposition and guard against an accident of that sort.

Dr. Edward Jackson, Denver: With reference to clouding of the cornea, I want to express my agreement with Dr. Risley's observation that a certain clouding of the cornea may be checked temporarily, and is rather frequent at an early stage. We know that the worst cases ultimately show some permanent clouding; but this early clouding may be entirely recovered from. I have not convinced myself that it is always located in, or confined to, the membrane of Descemet.

With reference to an anatomic peculiarity of the individual's cornea, I note that two of the cases I have given here were in brother and sister. They are the only two cases that I can recall occurring in the same family; but as far as this instance would go, it might point to a family peculiarity of the cornea. We certainly have myopia running in families to a striking extent; but it is quite unusual for conical cornea to affect more than one member of a family.

As to the number of cases, my forty-eight cases have not been seen in twenty-one years, but in thirty-five years. They include practically all the cases that I have had under observation for any length of time in private practice. The cases are not very common, and one case may be seen by a number of men—is apt to be so—and under observation for long periods of time, so that they seem to have an importance which the actual numbers do not support.

The pulsation of the conical cornea seen with the ophthalmometer I have occasionally noted; and I had one patient who spontaneously called attention to the pulsation of his vision. When the vision was about as well corrected as it could be, any active exertion gave him the pulsation of distinctness of vision. He could count his pulse by the changes in the distinctness of vision.

Infection of the nasal sinuses was not looked for in a good many of the earlier cases of the series. It has been present in some. My figures would not indicate how often. I am sure it is a condition worth careful looking for.

The lid pressure to which I called attention is not due to the deformity of the lids, or to the weight of the lids on the eyeball or from a narrow palpebral fissure. It is the pressure of a voluntary effort to change the refraction by lid pressure. The girl with myopia who could bring her vision right up did not do it by movements of the lids, but by placing the finger on the lower lids and making traction. In the case of the man, he made similar pressure on the cornea, but by a peculiar grimace; the lid was tensely drawn. The illustration was not as striking as his movements when first seen. As soon as he had put on glasses the pressure on the cornea stopped. The pressure then made his vision worse and he stopped it. That is the object of giving glasses, so that they will see best without additional pressure on the eyeball.

Dr. Meyer Wiener, St. Louis: I believe illumination is very important. I use ordinary north window daylight and no modifications, but I still retain good accommodation. There is no question about the difficulty of handling the sutures. They are complex and are apt to get twisted. That is merely a detail which can be overcome by care and patience. These plates do not cause any irritation. They lie flat against the cornea and the lids can bat over them after the bandage has been removed. In the animals on which I experimented, there was never anything put over the eye. I had no infection that I can recollect in any of the animals, and there were two or three dozen. The operation developed first by using a loop suture before the plates were used. The loop suture pulled through after a few days, never lasting long enough for the wound to heal, so that the plates were suggested.

I think emptying the anterior chamber purposely by a small puncture near the periphery is good. It gives a chance for the wound to heal and with, eventually, a better result. The advantage over cauterization is that if the operation is successful it leaves only a linear scar which can only be noticed by careful examination. I believe the operation should be performed only in extreme cases when all other palliative measures have been tried and have failed.

I have used also in a couple of cases of mild form epinephrin 1 to 1,000, as advised by Pontius, and seemingly the cases were improved greatly by its use.

I should like to see Dr. Fox, of all men, perform this operation. I think men who have highly developed technical skill—and I have never seen one with greater skill—should perform this operation. He is the type of man who can perform it and get a successful result.

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## PULMONARY EDEMA IN PNEUMONIA AND ITS TREATMENT *

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Edema of the lungs becomes a clinical condition when there is such an accumulation of tissue fluid in the tissue spaces that it transudes into the alveoli. Thus the patient's lung tends to fill with fluid to the exclusion of air, and actually approximates the condition in drowning. The edema appears first in the lower lobes and the middle lobe, and not till the late stages does it extend to any great degree to the upper lobes.

The first distinctive signs are dyspnea and large liquid râles over the lower lobes. In severe degrees of edema the breathing is that of suffocation, there is cyanosis, and there exudes or is expectorated from the mouth a thin serous frothy fluid often tinged with blood. This fluid contains protein, and is recorded as amounting to as much as 2 liters (J. L. Brown[1]).

Edema of the lungs may present itself in many pathologic states. In pneumonia it may appear either as a slight local area of edema surrounding the inflamed portion of lung, and of no clinical importance, or it may occur with considerable rapidity of onset as a generalized edema such as that described. This exposes the patient to a suffocative death, and calls for prompt measures if it is to be relieved. Fortunately it not infrequently proves amenable to therapeutic measures.

Edema is the result of a failure of the removal factors to keep pace with the production of tissue fluid, owing either to increased production or to diminished power of removal or to both. For its production, edema fluid has but one source, the blood, from which it transudes through the walls of the pulmonary capillaries. For its removal there are three pathways,

* Read before the Section on Pharmacology and Therapeutics at the Sixty-Eighth Annual Session of the American Medical Association, New York, June 1917.

1. Brown, J. L.: Virginia Med. Semi-Month., September, 1915.

namely, the capillaries, which empty into the pulmonary veins; the lymphatics, which empty into the systemic venous system, and in the severe cases the bronchial tubes, which carry it to the mouth to be exuded. That the capillaries carry away by far the greater part of the tissue fluid has been firmly established by Starling;[2] and we must accept Starling's dictum that "while capillary blood pressure determines transudation, the osmotic pressure of the proteins of the blood determines absorption." For it is obvious that while tissue fluid may transude from the capillaries owing to the filtration pressure in the blood stream, there cannot be a tissue-fluid pressure sufficient to make filtration back into the capillaries. Hence the surplus fluid must return to the capillaries by osmosis; and this happens because after the transudation of the diffusible substances by filtration through the capillary walls, the capillary blood is concentrated and its osmotic pressure is greatly increased, so that it can again take up diffusible fluid. It is not known whether or not the proteins as well as the salts in the fluid can be reabsorbed.

The factors favoring increased production of tissue fluid are:

1. *Increased Intracapillary Pressure.*—Filtration from the capillaries is dependent largely on the pressure in the capillaries; and the extent to which filtration may be changed by raising the intracapillary pressure is shown by an experiment of Starling[2] in which raising the blood pressure by 50 mm. of mercury for a few minutes was sufficient to cause an increase of loss by filtration of from 10 to 15 per cent. of the blood volume. Increased intracapillary pressure may result from heightened arterial pressure, dilatation of the arterioles, venous obstruction, or increased total volume of blood (plethora). It may rise so high as to break down the normal resistance of the capillary wall and permit a larger percentage of proteins than normal and even blood cells to pass through.

2. *Increased Permeability of the Capillary Wall.*—This may result from circulating poisons, local irritants, or lack of oxygen or nutritive material. The last conditions are present in prolonged venous congestion. With acetic ether administered intravenously, Miller and Mathews[3] obtained pulmonary edema whether there was a rise in pulmonary pressure or not. Fischer[4] believes that "an edema results whenever the oxygen supply to the parenchyma of the lung is sufficiently interfered with." Welch[5] has stated that a larger proportion of the cases of pulmonary edema than is generally supposed is due to inflammatory changes in the vascular walls.

3. *Hydremia.*—This condition, which is an excess of water in the blood, if accompanied by plethora, as after a large intravenous infusion of physiologic sodium chlorid solution, may be a factor in the increased production of tissue fluid.

The factors favoring diminished removal of tissue fluid are:

1. *Lymph stagnation,* due either to decreased motion of the lungs or to obstruction of the lymphatic trunks. As the lymphatics empty into the superior vena cava, congestion in the systemic venous system practically stops all lymph flow.

2. *Diminished capillary absorption,* owing either to venous obstruction, to a watery condition of the blood, or to transudations rich in protein and consequently with a high osmotic pressure. Such a transudate may be present in edema of the lungs. In one paroxysmal case Martin[6] found 6.302 per cent. of protein in the edema fluid.

3. *Increased molecular concentration of the tissues,* so that they have increased osmotic pressure, and therefore take up more fluid than normally or hold the fluid more firmly.

Between the production and removal factors there is great flexibility of accommodation, and it is probably not till more than one of the abnormal factors is present that edema ensues. Mackenzie[7] has declared that "edema of the lungs invariably accompanies dilatation of the right heart," and this is a frequent statement in textbooks. But aside from Mackenzie the best authorities on heart conditions agree that failure of the right ventricle will not make edema of the lungs; in fact, the best circulatory condition to favor the production of pulmonary edema would be failure of the left ventricle with continued activity of the right; or as stated by Welch[8] in 1878, there should be a disproportion in the work of the left ventricle as compared with that of the right. It is to be remembered, however, that in pneumonia the right and left ventricles usually fail together, as, for example, when auricular fibrillation supervenes. The consequent venous obstruction of itself produces the necessary combination of factors, for it results in increased capillary transudation, in increased permeability of the capillary wall owing to malnutrition and lack of oxygen, in diminished capillary absorption, and in lymphatic stagnation (the lymph either stops flowing or passes into the superior vena cava and thus immediately returns to the pulmonary capillaries). A part of the oxygen and nutritive supply to the lungs also comes from the bronchial arteries, which fail in their supply when the left ventricle breaks down. Bolton,[9] working with Starling, has shown that stagnation of blood alone without either plethora or raised capillary pressure may suffice to produce edema.

Manifestly, therefore, the most important cause of pulmonary edema is failure of the heart. Contributory causes would be any of the other causes of dyspnea, and of these the first in importance would be depression of the respiratory center. But not to be forgotten also among the causes of dyspnea are acidosis, severe pleurisy, and the direct and reflex effects of pressure below the diaphragm from tympanites or acute dilatation of the stomach. Further possible contributory causes may be the presence of an inflamed area in the lung tissue, and a general invasion of the lung by bacteria.

Among the important factors favoring the movement of blood through the lungs are adequate respiratory movements (Mackenzie[7]). These may be interfered with because of a depressed respiratory center, or because of the mechanical limitation of the excursion of the ribs or diaphragm owing to an extensive pleurisy or to upward pressure against the diaphragm by abdominal distention. Further, as pointed out by

2. Starling, E. H.: The Fluids of the Body, W. T. Keener & Co., 1909.
3. Miller and Mathews: A Study of the Mechanical Factors in Experimental Acute Pulmonary Edema, Arch. Int. Med., October, 1909, p. 356.
4. Fischer, M. H.: Edema and Nephritis, New York, John Wiley & Sons, 1915.
5. Welch, quoted by Hare, in Osler and McCrae: Modern Medicine, Philadelphia, Lea & Febiger, 1914, **2.**
6. Martin, quoted by Hewlett, H. M.: Intercolonial Med. Jour., Australasia, 1903, **8,** 611.
7. Mackenzie, J.: Diseases of the Heart, Oxford Medical Publications, 1913; Symptoms and their Interpretation, Shaw & Sons, 1909.
8. Welch: Virchows Arch. f. path. Anat., 1878, **72,** 375.
9. Bolton and Starling: Heart, 1909-1910, **1,** 292.

Hirschfelder,[10] when the edema is once established, the lung is distended so that its tissues are under compression; and its elasticity is lowered so that it gives a respiration resembling that of emphysema.

That acidosis is a cause of edema has not been established; but von Jaksch[11] reported the finding of acetone in the expired air in some cases of edema of the lungs, and Norris[12] mentions the frequency of acetone in the pneumonia urine. Furthermore, Lewis[13] pointed out the prevalence of acidosis in lobar pneumonia, and held acidosis as largely responsible for the pneumonia dyspnea, and later Lewis and Barcroft[14] reported severe acidosis in three lobar pneumonia patients, two of whom died.

That bacterial invasion is a cause is suggested by the statement of Welch that in irregular and localized edema (not pneumonic) and in extensive and even general edemas, he obtained colonies of bacteria from the lungs, mostly streptococci and lanceolate micrococci, in such numbers that they must have been in active growth in the lungs.

That anaphylaxis is a possible cause of pulmonary edema was established by Rosenau and Anderson;[15] but any anaphylactic reaction in the pulmonary edema of pneumonia has not been demonstrated.

### TREATMENT

Our therapeutic aim must be to lessen the production and increase the removal of the fluid. Both objects are to be accomplished primarily by improvement in the pulmonary circulation, and secondarily by attention to the contributory factors. In all cases, therefore, cardiac failure is to be treated. In addition, further therapeutic consideration may be required for respiratory insufficiency, acidosis, deficient oxidation, and abdominal distention.

*Cardiac Failure.*—This may come on suddenly with a change of rhythm, such as with the onset of auricular fibrillation or auricular flutter, or it may come on more gradually with simple acute dilatation. Its treatment is by a member of the *digitalis* series. In auricular fibrillation or auricular flutter an intravenous injection of strophanthin or ouabain, 0.5 mg. ($\frac{1}{130}$ grain), acts usually in an hour or less. If no effect is apparent, it may be repeated two hours after the first dose. In simple dilatation it works more slowly and less certainly. If digitalis has already been given, as is frequently the case in pneumonia, the beginning intravenous dose of strophanthin should not exceed 0.3 mg. ($\frac{1}{200}$ grain); for in patients already under the influence of digitalis, a single milligram of strophanthin intravenously has caused death. I do not include camphor, strychnin and caffein in this section, as I do not consider them circulatory stimulants.

*Nitroglycerin* has many advocates on the theory that it relieves the left ventricle by opening up the systemic arterioles. But failure of the left ventricle in pneumonia is not due to high tension in the systemic arteries, and therefore a result is obtained that is not wanted. Furthermore, nitroglycerin tends to open up the pulmonary arterioles and so let more blood into the pulmonary capillaries to produce more edema fluid. Stengel [16] says that, in his experience in acute paroxysmal pulmonary edema, nitroglycerin and the nitrites generally failed entirely; while Miller and Mathews[3] in nitric oxid edema of the lungs found that it did not dilate the pulmonary arteries and only had the undesirable effect of a marked fall in carotid pressure. On the other hand, however, Ward[17] of Albany, declares that it must be used in large doses, from $\frac{1}{20}$ to $\frac{1}{10}$ grain every minute for thirty minutes, and that it relieves the dyspnea even before it causes flushing of the face—a statement which I do not quite comprehend, for flushing comes almost instantly; and if the dyspnea is so quickly relieved why continue the remedy for thirty minutes?

*Venesection* is considered one of the most reliable procedures in the pulmonary edema of pneumonia. It has the effect of lessening systemic venous congestion and the plethora which exists in a stagnant circulation. Bolton and Starling[8] consider that it serves to relieve the distention at the venous end of the heart, and so enables the heart to beat more effectively. In conditions of circulatory stagnation they found that in all phases of respiration there is probably slight positive pressure in the big veins near the heart instead of the normal alternating positive and negative pressure, and that this was a definite obstruction to the emptying of lymph into the venous system. Lazarus-Barlow[18] has noted that after bleeding, the specific gravity of the tissues rose, that is, tissue fluid had been lost. Burton-Opitz[19] has shown that venesection regularly lowers the viscosity of the blood, and Starling[2] has pointed out that by venesection not only is diffusible fluid removed from the plasma but also proteins in large quantity, and that the blood volume is quickly restored by absorption of isotonic tissue fluid, so that it becomes more watery. Lawrence[20] believes that repeated bloodletting, when indicated, does not have any ill effects on the composition of the blood, and Hamburger[21] demonstrated that the freezing point of the blood remains unaltered. It is to be noted that in pneumonia we are not dealing with high arterial pressures, as in uremia.

Miller and Mathews,[3] in their experimental edema of the lungs, found that before any effect could be seen on the pressure in the pulmonary artery it was necessary to withdraw a sufficient amount of blood to lower the general blood pressure to a dangerous degree. The pressure in the pulmonary artery, however, is not the criterion of the value of any procedure in pulmonary edema, as this pressure is dependent on the relation of the right ventricular output to the caliber of the pulmonary arterioles. These, though weak in muscle, are the gates which regulate capillary inflow, and may be looked on as protectors of the capillaries.

Rolla[22] calls attention to the lessening of the alkalinity of the blood following venesection, and advises that when there is a tendency to acidosis it be accompanied by the administration of alkali.

*Respiratory Insufficiency.*—To stimulate the respiratory center, the three drugs most considered are atropin, caffein and strychnin. Further treatment for respiratory insufficiency might be oxygen inhalation, artificial respiration, the removal of mechanical impediments to breathing, and counterirritation.

10. Hirschfelder, A. D.: Diseases of the Heart and Aorta, Philadelphia, J. B. Lippincott Company, 1910, p. 147; Proc. Internat. Cong. Med., 1913.
11. Von Jaksch: See Norris, Note 12.
12. Norris, in Osler and McCrae: Modern Medicine, Philadelphia, Lea & Febiger, **2**, 948.
13. Lewis, T.: Lectures on the Heart, Paul B. Hoeber, 1915.
14. Lewis, T., and Barcroft, J.: Quart. Jour. Med., 1915, **8**, 30.
15. Rosenau, M. J., and Anderson, J. F.: Sudden Death Following the Injection of Horse Serum, Bull. 20, Hygienic Lab., U. S. P. H. S.
16. Stengel, A.: Am. Jour. Med. Sc., 1911, **141**.
17. Ward, S. B.: Albany Med. Ann., November, 1909.
18. Lazarus-Barlow: Jour. Physiol., 1894, **16**; 1895, **19**; 1896, **20**.
19. Burton-Opitz, R.: Quart. Jour. Exper. Physiol., 1905.
20. Lawrence: Boston Med. and Surg. Jour., February, 1916.
21. Hamburger: Osmotischer Drunk und Ionenlehre, Wiesbaden, 1904, **2**, 30.
22. Rolla, C.: Riforma Med., Naples, 1914, **30**, 28.

(*a*) *Atropin:* In therapeutic amounts, atropin has but little power to stimulate the respiration in man. It does, however, tend to dilate the bronchi, and this may in some cases prove useful. There is a remote possibility also that by abolishing vagus action it may have the same effect as cutting the vagus nerves, which Porter and Newburgh[23] have shown to result in a normal respiratory rate in pneumonia in dogs. They believed that this prevented the exhaustion of the respiratory center. We hardly think this a possible effect of atropin in human pneumonia. Atropin has the great disadvantage that through vagus action it abolishes any action of digitalis or strophanthin on the auriculoventricular conduction tissues, and completely neutralizes the effect of digitalis or strophanthin in steadying the work of the left ventricle. Furthermore, as Miller and Mathews[3] report, in the experimental production of edema of the lungs by the intravenous administration of acetic ether or iodids, the developing edema was not checked by atropin, nor was the life of the animal prolonged. And in experimental epinephrin edema of the lungs in rabbits, Stengel[16] found that atropin actually increased the rapidity of onset and the degree of edema. It does not act, as asserted by some, to "dry up the secretion," for the edema fluid is a transudate and not a secretion. Atropin, therefore, would seem to give little promise of real value, and to have decided disadvantages. But it is not to be feared, as stated by Talley,[24] because of its "marked vasomotor stimulant influence with consequent rise in blood pressure," for atropin as used therapeutically does not have such an action.

(*b*) *Caffein:* In the doses available in man caffein is distinctly stimulating to the respiratory center. I have several times seen edema of the lungs in pneumonia supervene on a respiration greatly slowed by morphin given for pleuritic pain; and I have seen these edemas and others not due to morphin yield quickly to hypodermics of caffein and sodium benzoate. That the diuretic value of caffein may add to its advantages is a bare possibility, though it is probable that diuresis, unlike in other edemas, aids but little if any in influencing edema of the lungs in pneumonia. That therapeutic doses of caffein do not act by stimulating the circulation is now well established. A possible disadvantage, as mentioned in my book on pharmacology,[25] and later by Barton,[26] is a slight effect in counteracting the action of digitalis on the heart in auricular flutter or fibrillation; but this action on auriculoventricular conduction is slight as compared with that of atropin. Caffein is only an emergency drug, and should not be employed as a routine in pneumonia, as it interferes with sleep.

(*c*) *Strychnin:* This is too weak a respiratory stimulant for therapeutic use, but it may enhance the value of other measures by inducing a general increase of reflex activity. If the reflexes are already overactive, strychnin is contraindicated.

(*d*) *The Inhalation of Oxygen:* This is employed in the full belief that it increases the oxygen carried in the blood. That it does so is probable but not altogether proved. Loevenhart[27] laid stress on the fact that even when the supply of oxygen is ample, decreased oxidation in the body may occur; Kraus[28] showed that in cardiac failure the amount of oxygen taken up by the blood and of carbon dioxid given off is practically unchanged; and Zuntz and Schumberg[29] report that when they caused polypnea by carbon dioxid, and thus greatly increased the total oxygen taken into the lungs, there was no alteration in the amount of oxygen taken up by the blood.

Yet Benedict and Higgins,[30] at the Carnegie Nutrition Laboratory, found that oxygen inhalation lowered the pulse rate, though it induced no change in metabolism, and no change in the character, depth or frequency of respiration. And Parkinson, in reporting a similar lowering of the pulse rate, attributed it to the improved work of a better oxygenated heart muscle. Starling found that with the normal tension of oxygen in the alveolar air of man, the hemoglobin and plasma carried about 15.6 volumes per cent., while after the breathing of pure oxygen for a short time, the percentage rose to 19.9 volumes per cent. Hill and Flack[31] noted that after hard exercise of men not in good training, as in boxing bouts, it not only hastened their recuperation by abolishing the hurried shallow breathing, but had a value in preventing the usual stiffness of the muscles which results from unwonted exercise. It would seem, then, that oxygen inhalation does result in a systemic effect, however the effect is brought about.

In cases of cyanosis, Starling calls attention to the fact that the high carbon dioxid tension of the blood lessens the degree to which the oxygen tension may be raised. G. N. Stewart noted that oxygen inhalation increased the blood flow in the hands in a case of recurring cyanosis due to the depressed respiration of emphysema and chronic bronchitis, and Bence found that, in cases of cyanosis, oxygen resulted in decreased viscosity of the blood.

The net results of these researches give us the impression that while oxygen inhalation has little effect in normal persons, it may have decided value in those cases in which the oxygen tension of the blood is already low. And this is the case in pulmonary edema in pneumonia.

Add to this the probable benefit of a direct supply of more oxygenated air to the lung tissues and the impaired capillary endothelium, and the good effect of increased oxygenation on acidosis, and it would seem that the inhalation of oxygen is a good therapeutic measure.

(*e*) *Artificial Respiration:* Adequate respiratory movements are important in the propulsion of blood through the lungs, inspiration normally enlarging the capacity of the pulmonary capillaries and veins. But in pulmonary edema the lungs are more or less in the same condition as in emphysema, and their excursion is diminished. Therefore, compression of the chest in expiration to take the place of the lost lung elasticity, and expansion in inspiration tend to overcome stagnation in the pulmonary blood stream. Following the suggestion made by Haven Emerson,[32] after he found that he could abolish experimental edema of the lungs in animals by artificial respiration, using positive pressure through the trachea, Barringer[33] employed

23. Porter and Newburgh: Am. Jour. Physiol., December, 1916.
24. Talley, in Musser and Kelly: Practical Treatment, Philadelphia, W. B. Saunders Company, 1914, p. 199.
25. Bastedo, W. A.: Materia Medica, Pharmacology and Therapeutics, Philadelphia, W. B. Saunders Company, 1913.
26. Barton, William: Am. Jour. Med. Sc., 1915, p. 150.
27. Loevenhart, A. S.: Harvey Lectures, Philadelphia, J. B. Lippincott Company, 1914-1915.
28. Kraus, quoted by Hirschfelder (Note 10).
29. Zuntz and Schumberg, quoted by Hirschfelder (Note 10).
30. Benedict and Higgins: Am. Jour. Phys., 1911, **28.**
31. Hill and Flack: Recent Advances in Physiology and Biochemistry, Edward Arnold, 1908.
32. Emerson, Haven: Artificial Respiration in the Treatment of Edema of the Lungs, Arch. Int. Med., May, 1909, p. 368.
33. Barringer, T. B.: Pulmonary Edema Treated by Artificial Respiration, Arch. Int. Med., May, 1909, p. 372.

full artificial respiration with success in a pulmonary edema not pneumonic. It was thought that positive pressure could not be used in human beings, and it is a question whether even ordinary artificial respiration could be instituted in a pneumonia patient. But Kulenkamp[34] confined his efforts to compression of the thorax in expiration, and reports good results. Mackenzie[7] suggests removing all restraint by placing the patient in the position to breathe most freely and by making him inspire deeply. I would suggest that possibly a mechanical apparatus might be employed, though I have no knowledge of any such. (Since this was written Dr. S. J. Meltzer has brought forward such an apparatus.)

(*f*) *The Relief of Abdominal Pressure:* This may be accompanied by a hypodermic of pituitary extract followed if necessary by other methods for treating tympanites or acute dilatation of the stomach. It is to be noted that in pneumonia gastric lavage is impossible or at least dangerous.

(*g*) *The Removal of the Limitation of Breathing from Pleurisy:* This requires that if the patient's side has been strapped, the strapping should be removed to allow freer motion.

(*h*) *Counterirritation:* This is generally obtained by mustard, dry cupping, hot fomentations or hot poultices. As there is no direct anatomic connection of the lung tissues with the chest wall, any effect on the lungs must of necessity be through the nervous system. That a relation through the nervous system does exist was demonstrated by Dana in 1887, and in 1903 Head[35] pointed out that tenderness of the superficial tissues might be a manifestation of inflammation or injury to one of the internal organs. Mackenzie,[7] Hertz[36] and Sherrington[37] have demonstrated conclusively that irritation of the superficial tissues which are supplied by the cerebrospinal nervous system may affect underlying viscera and vice versa. So far as the abdomen is concerned, there is some evidence to suggest that strong counterirritation results in constriction of the arterioles in the underlying viscera, and it is possible that such an effect takes place in the lungs. At any rate, counterirritation is one of the measures regularly employed and valued in the edema of pneumonia. I employ dry cupping. In dry cupping, the mechanical edema of the tissues produced by suction can hardly be a factor beyond the counterirritant effect. That is to say, the popular belief that fluid is sucked out of the lungs by the cups is a fallacy.

(*i*) *Lowering of the Head-End of the Body:* This procedure, to facilitate removal of the fluid from the lungs, has been practiced with benefit in edema of the lungs from pilocarpin and anesthetics. It is possible that some change in posture might favor the emptying of the lungs in pneumonia.

*Acidosis.*—In diabetes, when acidosis is serious, the specific remedies are great quantities of alkali, such as sodium bicarbonate, and great quantities of water administered by every available route. But in pulmonary edema much water is contraindicated, and isotonic solutions of sodium bicarbonate should not be given either by rectum or intravenously, for the fluid thus introduced has a tendency greatly to increase the capillary transudation in the lungs. Sodium bicarbonate should, however, be given by mouth; or, if this is not feasible, it may be introduced intravenously in hypertonic 10 per cent. solution in amounts of 400 c.c. I have had experience with this and have found the hypertonic solution absolutely well borne. As mentioned before, oxygen inhalation probably tends to lessen acidosis, and venesection tends to increase it.

*Morphin* has proved almost specific in acute paroxysmal edema of the lungs, as described by Stengel,[16] probably because, as suggested also by Billings,[38] "in many of these patients an element of shock and mental disturbance contributes to the severity of the symptoms." But in the complicated edema of pneumonia it is dangerously depressing to the respiration, checks expectoration and favors the development of tympanites.

SUMMARY

In the treatment of pulmonary edema in pneumonia, the most reliable procedures are: strophanthin intravenously, caffein subcutaneously, oxygen inhalation, venesection, and perhaps counterirritation to the chest. Supplementary treatment should be determined by the presence of acidosis or other associated conditions.

57 West Fifty-Eighth Street.

34. Kulenkamp: Deutsch. med. Wchnschr., 1909, **25**, No. 32.
35. Head, H., Brain, 1893, **16**; 1894, **17**.
36. Hertz, A. F.: The Sensibility of the Alimentary Canal, Henry Frowde, 1911.
37. Sherrington, C. S.: Schäfer's Text Book of Physiology, 1900, **2**.

## ABSTRACT OF DISCUSSION

DR. SAMUEL J. MELTZER, New York: In discussing Welch's theory of pulmonary edema Dr. Bastedo referred to its presentation in my lectures on edema and made a statement which I wish to correct. Inflammatory processes of the lung do not play a rôle in this theory. The essential point of it is the assumption that in pulmonary edema there is a disproportion between the activities of the two ventricles, that of the right being more effective. The difference need not be large.

I was pleased that Dr. Bastedo did not mention epinephrin as a possible therapeutic agent. Several years ago its use was advised by some of our consultants. About fifteen years ago I discovered that epinephrin is often an effective agent to produce pulmonary edema—but not to cure it. The Transactions of the Association of American Physicians several years ago contained an illuminating discussion of that subject.

Dr. Bastedo did not mention artificial respiration as a therapeutic means. When Dr. Emerson suggested it several years ago I had then some doubts about its usefulness. I think now more favorably of it; it ought to be given a trial, especially when one is in possession of a reliable apparatus.

DR. JACOB DINER, New York: Dr. Bastedo pointed out three important factors in edema. Dr. Bastedo also mentioned the inefficacy of cupping, and I hoped he would say something about the cataplasmata for the purpose of drawing out the fluid. If we use this for its hygroscopic effect we can convince ourselves of its uselessness. It is only the glycerin in the cataplasm which is hygroscopic and that to a very limited extent. This can readily be demonstrated by exposing glycerin in a moist atmosphere. We are going contrary to the very mechanism (in physiology) which would aid circulation and we are increasing the intoxication. We are pressing on a chest which is already laboring hard, by putting 250 gm. of mud or kaolin on it. With the lowest average rate of respiration and expansion we have a load equaling 7,500 gm. raised 5 cm. per minute, and this by a chest already laboring hard. We are compressing the circulation, mechanically obstructing the venous return and adding to the pulmonary edema, and in addition calling on the heart for additional, unnecessary work. Too much cannot be said against this manner of medication.

DR. WALTER J. WILSON, JR., Detroit: I should like to emphasize the value of caffein. A number of years ago its use was followed in a short time by such results that a patient who seemed to be moribund made a good recovery and

38. Billings, quoted by Stengel (Note 16).

is now in good health. This was in a case of bronchopneumonia. Other similar cases have strengthened my faith in it under such conditions as described in the paper. Atropin, while it depresses the vagus endings, does not alter the effect of digitalis on the heart muscle directly and is not contraindicated unless other conditions such as auricular fibrillation are present.

DR. EDWARD F. WELLS, Chicago: The presence of the form of pulmonary edema which we usually have in mind in pneumonia is not of frequent occurrence but it is a contingency in any case, and for that reason preparation should be made for its possible appearance at the very beginning of treatment. It will not come on early and there is no harm in having things ready. Digitalis—I believe I voice the profession—is a useful remedy in pneumonia, and personally I begin early and continue it throughout the course of the disease, not in very frequent doses, but in amounts producing apparent effect. Strychnin is begun a little later and is given regularly for the special purpose of stimulating the reflexes, the respiratory in particular. Have ready a cylinder of oxygen, which may be of use and certainly can do no harm to the patient, but I do not advise its constant use; have it ready in case of emergency. Full instructions are given to the nurse as to what should be done in the actual appearance, which is usually sudden, of pulmonary edema. These directions consist first in giving at once 1/16 or 1/8 grain of morphin hypodermically. I place but little dependence on atropin, but a small amount may be given, say 1/150 to 1/200 grain; but morphin is the most important remedy in this case. So far as I have seen, the results of treatment depend on the promptness with which these measures are taken on the appearance of the edema. The second important advice is that immediately on the advent of edema the mouth and nostrils shall be made the lowest portion of an inclined plane. The whole body should be raised to such degree as will allow any excess fluid in the respiratory tract to escape by the mouth and nostrils. The amount escaping in this manner is sometimes very great. A stimulating enema of glycerin, Epsom salts and water is of secondary importance.

DR. WALTER A. BASTEDO, New York: My paper included a paragraph on morphin and also a paragraph on mechanical means for evacuating the fluid. I said morphin had proved successful in paroxysmal edema, but in the complicated edema of pneumonia I believe it should not be employed, as it is dangerous to the respiration, checks expectoration and favors tympanites. I have known edema to be produced by morphin in pneumonia. Like Dr. Wells, I use digitalis early in pneumonia, and this same practice has been adopted at the Rockefeller Institute.

Dr. Wilson's question about atropin versus digitalis is a big one to discuss. Undoubtedly often cardiac failure in pneumonia is the result of the onset of auricular fibrillation or auricular flutter. The impulses going from the auricle to the ventricle cause the ventricle to beat in a disorderly and inefficient manner. In these cases we deal with a disturbance of rhythm, and our desire in the use of digitalis is to prevent the passage of the smaller impulses from the auricle to the ventricle; that is, we desire a degree of heart block so that the ventricle can go on beating efficiently without regard to the erratic beating of the auricle. This is the effect of digitalis in these cases, and it is annulled by atropin. The stimulation of the muscle of the heart has not been proved to be an effect of digitalis that can be elicited satisfactorily in therapeutics; and as a rule the effect on the rhythm is evidently greater than the strengthening effect on the muscle. Furthermore, stimulation of the muscle often has the effect of causing great excitability of some part of the muscle, so that we get extrasystoles without increasing the work of the ventricle. I think, therefore, it is of great importance in pneumonia not to check by the administration of atropin, any possible value of digitalis on the auriculoventricular bundle of His. In regard to Dr. Meltzer's remarks I think that Dr. Welch answered well the arguments against his theory. I am glad that Dr. Meltzer referred to the subject. A disproportion between the right and left ventricles is not an easy thing to determine, and if the heart failure is due to a change in rhythm, as it frequently is in pneumonia, both ventricles fail together. The epinephrin question I did not bring up because Dr. Meltzer many years ago established the idea that it was dangerous in any condition that might lead to edema of the lungs. As he mentioned, too, the edema of the lungs from epinephrin occurs usually when you do not want it.

## VERTIGO AS A SYMPTOM OF PRIMARY DISEASE OF THE LABYRINTH*

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The symptom of vertigo was for the first time associated with disease of the internal ear by Ménière in 1861. Previous to that year, vertigo was considered to be a symptom distinctly of intracranial disease. Ménière published a series of articles on the occurrence of disease of the internal ear presenting symptoms resembling cerebral apoplexy. Eleven cases in all were reported, in which in the absence of any previous ear trouble the patient was suddenly seized with vertigo, associated with tinnitus and deafness. One of his patients died from an unknown cause five days after the attack of vertigo. The macroscopic postmortem examination disclosed a grumous mass filling the semicircular canals. No lesion was detected in the brain or spinal cord. On the basis of these findings, together with the facts regarding disturbance of equilibrium brought out by the experiments which Flourens had previously carried out on the semicircular canals of pigeons, Ménière concluded that the symptoms observed in his patients were the result of hemorrhage into the labyrinth.

Following these publications by Ménière, a great many cases have been reported presenting the characteristic symptoms of sudden onset of vertigo with tinnitus and deafness. Many of these were described as cases of Ménière's disease, and it was assumed that hemorrhage into the labyrinth was responsible for the labyrinth disturbance. The symptoms have appeared quite variant in different cases. In some, a single attack, with sudden onset, threw the patient violently to the ground and produced severe tinnitus with total permanent loss of hearing. In others, there was a long series of attacks, varying widely in severity. In most of these cases each attack registered a distinct progress in an increasing labyrinth deafness. In some, the disturbance of equilibrium, as well as the tinnitus and the deafness, was slight and appeared quite transitory. In still others, the vertigo occurred quite independent of tinnitus or deafness. It became apparent quite early that one cause was not responsible for the symptoms in all of these cases. In some, the symptoms were the result of disturbance in the labyrinth caused by an extension of middle ear infection. In other cases the symptoms were the result of demonstrable intracranial disease. Of those cases in which the disease was primarily in the labyrinth, not infrequently the manner of onset, as well as the transitory character of the disturbance, precluded the possibility that an actual hemorrhage into the labyrinth had given rise to the symptoms.

An effort has been made by some writers to restrict the use of the term "Ménière's disease" to those cases of primary involvement of the labyrinth in which the

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suddenness of the onset, together with the marked permanent loss in the hearing, seemed to make the diagnosis of an actual hemorrhage into the labyrinth the probable cause. The gradual transition between those cases in which hemorrhage into the labyrinth seemed to account most readily for the symptoms and those in which, from the transitory character of the symptoms, the possibility of an actual hemorrhage was excluded, made it quite impossible to separate a distinct group of cases and assert that these alone were the result of hemorrhage into the labyrinth, and that all the other cases of primary disease of the labyrinth presenting symptoms of attacks of vertigo with tinnitus and disturbed hearing were not caused by hemorrhage.

For these reasons many writers have given up the use of the term "Ménière's disease" for any of these cases, even for those in which it seems certain that a hemorrhage into the labyrinth has given rise to this syndrome, as, for example, when these symptoms occur in cases of pernicious anemia. The term "Ménière syndrome" has, however, come into general use to designate attacks of vertigo when associated with tinnitus and deafness, irrespective of the cause, whether it be from disease of the labyrinth secondary to middle ear infection or to meningitis, or to disease occurring primarily in the labyrinth, or whether it is occasioned by intracranial disease causing disturbance of the central tract of the eighth nerve. This term is an appropriate one by which to designate a characteristic group of symptoms, especially since it serves to perpetuate in otologic literature the name of the physician whose contribution represented a distinct epoch in otology.

Vertigo is now recognized to be as distinctly an aural symptom as is tinnitus, and when present indicates a disturbance of the vestibular nerve, either in its peripheral distribution in the semicircular canals or in its central pathways in the brain. In this paper I shall discuss only those cases of primary disease of the labyrinth producing vertigo.

## PHYSIOLOGY

In order to interpret intelligently the symptoms of vertigo arising from disease of the labyrinth, it is important to keep clearly in mind a few fundamental facts in the physiology of the internal ear. The mechanism in the labyrinth for preserving the body equilibrium, the vestibular apparatus, accomplishes this end largely through the medium of tonus impulses to the skeletal muscles, which keep these muscles in a state of constant stimulation. The tonus impulses from the two labyrinths stimulate for the most part opposing groups of muscles, and since the impulses from both sides are equal, a state of equilibrium is preserved. A sudden alteration in the tonus from one labyrinth disturbs this equilibrium and gives rise to vertigo. The disturbance of equilibrium arising from a sudden disturbance of tonus is always temporary because a compensatory tonus rapidly develops to restore the equilibrium. A gradual destruction of function in one or both labyrinths may proceed even to the point of complete loss of function without ever giving rise to sensations of vertigo.

Keeping these fundamental facts in mind, let us inquire into the various processes which are known to involve the labyrinth primarily and produce the symptom of vertigo. In the first place there can be no doubt that a hemorrhage into the labyrinth will produce the characteristic Ménière syndrome. Hemorrhage into the labyrinth is, however, in all probability a very rare occurrence, whereas vertigo from primary disease of the labyrinth is by no means uncommon. It is indeed doubtful whether the symptoms in any of the cases reported by Ménière were the result of hemorrhage into the labyrinth. Regarding the one case which came to postmortem, there are good reasons for believing that this case was one of epidemic meningitis with extension into the labyrinth. The view that the labyrinth symptoms resulting from large doses of quinin are caused by a congestion or actual hemorrhage into the labyrinth is now given up. In the same way, the Ménière syndrome, which so frequently develops in cases of chronic progressive nerve deafness, is in all probability not often, if ever, the result of hemorrhage in the labyrinth, as was previously supposed. The conditions which are known to produce hemorrhage into the labyrinth include especially such diseases as pernicious anemia, leukemia and purpura hemorrhagica.

Embolism of the labyrinthine artery occurs especially in caisson workers, as the result of gas emboli, and produces in its most characteristic form the apoplectic type of the Ménière syndrome. I have seen a single case in which a blood embolism lodging in the artery of the labyrinth appeared to be the probable cause of a sudden attack of the Ménière syndrome, with a total permanent loss of hearing. The accident occurred during the puerperium, about one week after confinement.

Vertigo is not an infrequent symptom of advanced otosclerosis, in which its occurrence heralds the extension of the spongifying process involving the bony capsule of the labyrinth to the semicircular canals.

Syphilis, both during the secondary and the tertiary stages, often invades the labyrinth, giving rise to attacks of vertigo. Involvement of the labyrinth in hereditary syphilis is also quite frequently observed. In these cases, attacks of vertigo are not at all uncommon, and when present indicate a fresh extension of the disease. Very often in cases of syphilitic degeneration in the labyrinth, in which the involvement of the vestibular mechanism can be demonstrated by means of the turning tests, as well as by caloric stimulation, the process does not cause vertigo. This absence of vertigo is sometimes observed in cases in which, judging from the progress of the deafness, the degeneration appears to be extending quite rapidly. In explanation of the absence of vertigo, it is believed that the loss of function has proceeded so evenly as to allow the development of compensatory tonus to keep pace with the loss of labyrinth tonus. It is only a sudden progress in the degenerative process that enables the disturbance of tonus to give rise to vertigo. This vertigo will take place when the progress of the disease has been comparatively slight, provided only that it develops suddenly.

Neuritis of the eighth nerve is a not infrequent cause of vertigo. This neuritis may be the result of poisoning from drugs, such as quinin, tobacco or alcohol. More often the neuritis is caused by toxins from infectious fevers, such as measles, scarlet fever, diphtheria, influenza, mumps, typhoid and florid tuberculosis. As a rule, the involvement of the vestibular nerve causing attacks of vertigo takes place simultaneously with a degeneration of the cochlear nerves, producing tinnitus and deafness. In some cases the vestibular nerve alone is involved. Here tinnitus and

deafness are absent, and only the attacks of vertigo indicate the involvement in the internal ear.

By far the most frequent occurrence of vertigo is in association with a chronic degenerative process developing quite independent of syphilis or of the infectious fevers and involving, as a rule, the peripheral neurons of both the cochlear and the vestibular nerves. When the cochlear nerve is involved, the characteristic symptoms are a continuous high pitched tinnitus and a more or less extensive defect in hearing at the upper end of the tone scale. In some cases the vestibular nerve alone is involved. The involvement of the vestibular nerve is not infrequently associated with attacks of vertigo. Such attacks are always an indication of a sudden increase in the degenerative process and are associated with an increase in the tinnitus and the deafness when the cochlear nerve is also involved in the process. It is possible by means of the rotation tests and the caloric stimulation to demonstrate the loss of function taking place in the semicircular canals in these cases. It has been for these cases of primary disease of the labyrinth of unknown origin, presenting the characteristic attacks of the Ménière syndrome, that some would have us preserve the term "Ménière's disease," the assumption being that the distinct attacks are each the result of hemorrhage into the labyrinth.

The characteristic course which these cases take, the chronic progressive nature of the degeneration going on in the labyrinth, the acute exacerbations, often occurring quite suddenly, and resulting in attacks of vertigo associated, as a rule, with tinnitus and deafness, all resemble so closely the course of neuritis in other nerves when caused by chronic foci of infection, that it seems entirely probable that focal infection may be the underlying cause for not a few of these cases of progressive degenerative processes involving the eighth nerve.

The sudden exacerbation producing the characteristic Ménière syndrome can be accounted for exactly as are the exacerbations in any peripheral neuritis of focal origin, as the result of a fresh shower of bacterial emboli liberated from the primary focus and which, for some as yet not entirely accounted for predilection, select the peripheral neurons of the eighth nerve as their target. The varying degree of the severity of the attacks, ranging from a total, even permanent, destruction of function to the slight temporary disturbance sometimes observed, finds here a ready explanation, which was not the condition when we assumed that the severe cases of the Ménière syndrome occurring in primary disease of the internal ear were the result of hemorrhage into the labyrinth, and the milder cases were the result of an angioneurosis. The fact that the degenerative process in the labyrinth may progress without acute exacerbation and therefore without attacks of vertigo is quite in harmony with the chronic neuritis of other nerves.

An additional evidence that focal infection takes a part in the production of neuritis of the eighth nerve is found in those cases in which the Ménière syndrome is observed in patients suffering from acute articular rheumatism. In the literature there are a number of such cases reported as rheumatism of the internal ear. We now regard acute articular rheumatism as a systemic infection from some primary focus, which very often is located in the faucial tonsil. The occurrence of acute exacerbations is one of the characteristic symptoms developing in cases of acute rheumatism.

SUMMARY

1. Primary disease of the labyrinth produces attacks of vertigo whenever the vestibular apparatus is involved by an acute process.

2. Hemorrhage into the labyrinth is much less common than was formerly supposed.

3. An embolus lodging in the labyrinthine artery occurs especially in caisson workers, as the result of gas emboli, and gives rise to the characteristic Ménière syndrome.

4. Syphilis in the secondary and tertiary stages, as well as in hereditary syphilis, not infrequently involves the internal ear and gives rise to vertigo.

5. Neuritis of the eighth nerve from overdoses of drugs, such as quinin, tobacco and alcohol, may produce neuritis of the eighth nerve with the Ménière syndrome.

6. Toxic neuritis of the eighth nerve as the result of infectious fevers frequently gives rise to attacks of vertigo.

7. The most frequent occurrence of vertigo is in connection with a primary chronic degenerative process involving the peripheral neurons of the eighth nerve and occurring independent of syphilis or the infectious fevers.

8. The probable cause for many of these cases is to be found in a neuritis of the eighth nerve, as the result of some chronic focus of infection, such as is so frequently seen in chronic disease of the faucial tonsil.

9. Attacks of vertigo occurring in connection with acute articular rheumatism are the result of neuritis of the eighth nerve and a symptom of the systemic infection from some primary focus.

122 South Michigan Avenue.

## AURAL VERTIGO OCCURRING IN SUPPURATIVE DISEASE OF THE MIDDLE EAR*

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I think the majority of experienced otologists will confirm my statement that severe vertigo resulting from middle ear suppuration without labyrinthine involvement is not sufficiently common to call for prolonged discussion here. At least, the distinguishing features of the vertigo in such cases may be more profitably analyzed in connection with special case reports. The following conditions, however, require passing mention:

1. A few cases of chronic middle ear suppuration have been observed or reported in which granulations in the region of the oval window and pressing on the stapes have caused vertigo which has been relieved by careful removal of the granulations. I recall one such case which I saw with Dr. Harmon Smith in which operation later was successfully performed by the late Dr. Sheppard of Brooklyn. The diagnosis of this condition would, in most cases, be tentative prior to operation. It could be determined with some degree of certainty only on (*a*) the presence of the granulations; (*b*) retention of fair hearing power; (*c*) normal reactions to the tests of vestibular irritation, and (*d*) absence of response to the fistula test. Such cases

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probably do not occur in the proportion of from 1 to every 5,000 cases of chronic middle ear suppuration.

2. Vertigo depending on a defect, either congenital or resulting from disease, in the labyrinthine capsule, the membranous labyrinth remaining intact, is a somewhat rare condition. Such a patient was sent by Dr. F. Risden from an outside clinic to the Manhattan Eye and Ear Hospital for examination and discussion. The salient features were a perforated drum membrane with moderate discharge, frequent typical attacks of vestibular vertigo, fairly good hearing, and a pronounced reaction to the fistula test.

3. Aural vertigo in middle ear suppuration depending on a so-called paralabyrinthitis—a congestion extending through the labyrinthine capsule to the membranous labyrinth—is usually easily distinguishable from the vertigo of diffuse suppurative labyrinthitis. The diagnosis and treatment cannot be discussed here.

4. Aural vertigo due to serous labyrinthitis need not be described, since it differs in no way from that due to suppurative labyrinthitis to be described later. Serous labyrinthitis, though probably a pathologic entity, is not in the acute or active stage easily distinguishable from suppurative labyrinthitis. The practical therapeutic deductions from this hypothetic lesion are nearly covered in the statement that a vertigo of distinctly vestibular type, accompanying a middle ear suppuration, and not coupled with complete unilateral loss of hearing should be treated as far as possible expectantly, that is, bone surgery, unless otherwise imperatively indicated, should be avoided or at least postponed until all symptoms suggestive of vestibular irritation have subsided.

The vertigo associated with all of the foregoing conditions is invariably and distinctly of vestibular type. I know of no distinct type of vertigo characteristic of suppurative disease confined to the tympanum. So invariable and constant are certain vestibular elements in every case of vertigo accompanying tympanic suppuration that the occurrence in such a lesion of a vertigo of different type would in itself go far to prove an extra-aural origin. If one speaks, therefore, of the vertigo of middle ear suppuration, one must inevitably refer to the familiar vestibular type.

## PHYSIOLOGIC BASIS OF SUPPURATIVE LABYRINTHITIS

Two clinical types of vertigo occur in suppurative labyrinthitis: (1) the vertigo of the onset or acute stage, and (2) the vertigo of the latent or quiescent stage. But in whatever phase or degree of severity it may be observed or whatever stage of the lesion it may represent, the physiologic basis is always the same: diminution or loss of vestibular irritability in the diseased ear.

It has been stated, probably on theoretical grounds rather than exact clinical observation, that the actual onset of a labyrinthine infection is announced by a symptom depending on vestibular irritation, that is, nystagmus toward the diseased ear, this initial irritation being quickly replaced by loss or diminution of vestibular irritability, and nystagmus toward the sound ear. Practically, this exceedingly transitory stage of initial irritation is never seen by the aurist in diffuse suppurative labyrinthitis. The vertigo of the acute stage cannot, therefore, be ascribed to vestibular irritability, but rather to disturbance of vestibular balance, the sudden loss of vestibular irritability in the diseased ear being in effect equivalent to stimulation of the opposite, sound vestibular mechanism.

## DIAGNOSIS

*The Vertigo of the Acute Stage.*—This symptom is accompanied by the following invariably associated phenomena: spontaneous vestibular nystagmus; subjective sensation of the rotation of surrounding objects in the plane of the nystagmus, and tendency of the patient, if standing, to fall or move in the plane of the nystagmus and in the direction opposite to that of the quick eye movement. The patient's vertigo is increased when he turns his eyes in the direction of the quick nystagmus movement, and is lessened when he looks in the opposite direction. These three concomitant symptoms of the onset constitute the characteristic syndrome of the acute stage of the disease.

*Course.*—It is impossible to dissociate these phenomena or to discuss one without the other. In uncomplicated cases of suppurative labyrinthitis, the vertigo, the nystagmus and the ataxia tend simultaneously and quite rapidly to subside, so that within a week or ten days following the onset, they may have completely disappeared. When the nystagmus has wholly disappeared, so also has the characteristic vertigo. After the nystagmus has completely subsided, the patient may complain of vague, indefinite sensations of dizziness. This subjective disturbance, which is not rotary in character, may be due to weakness, circulatory disturbance or gastric upset resulting from the attack; but such vertigo cannot be conclusively traced to the labyrinth.

*The Vertigo of the Latent Stage.*—This phenomenon is neither constant nor invariably prominent or noticeable. It refers to the liability of the patient, after all characteristic symptoms of the acute stage have disappeared, to a sudden, violent and usually quite unexpected disturbance of equilibrium during which, unless forwarned, he may meet serious injury. Such attacks, if they occur, are usually brief and are always induced by some body position or physical effort to which the patient has not become reeducated or reaccustomed, as on first going up or down stairs; sudden looking upward toward the sky; sudden turning while crossing a street in response to a noise; diving, or standing on some narrow support at an unaccustomed height (as on scaffolding). The danger of these attacks varies with individuals, and becomes progressively and rapidly more remote as the patient becomes reeducated in the various body postures and muscular actions, by which they may be induced. Until this process of reeducation is complete, however, it is clear that this form of vertigo may constitute a menace to the patient's life.

*Surgical Significance of Vertigo in Labyrinthine Infection.*—The surgical significance of the vertigo of the acute stage is that of a recent infection of a minute bone cavity the anatomic pathways from which to the meninges have not yet been closed or guarded by the deposition of inflammatory products. The surgical significance of the latent stage is of a focus of infection in a small bony space presumably walled off by inflammatory exudates, but still subject to further breaking down with consequent spread of infection to the meninges.

## GENERAL THERAPY

A logical general plan of treatment deducible from the foregoing and applicable to a majority of all cases of diffuse suppurative labyrinthitis not already com-

plicated by intracranial infection, might be formulated somewhat as follows: during the vertigo of the acute stage, absolute rest in bed; local treatment reduced to a minimum, and avoidance or postponement of all bone surgery not otherwise imperatively indicated. In the quiescent, or latent, stage, a radical operation, combined with careful surgical drainage of the labyrinth, is the only treatment in accordance with sound surgical law, and which safeguards the patient's future.

There is one other class of cases—rare, but of undoubted occurrence—which must be briefly mentioned. In the course of a chronic middle ear suppuration, the patient develops characteristic vestibular vertigo with associated phenomena. The symptoms gradually subside, leaving the ear absolutely deaf or hearing profoundly reduced; caloric reactions are absent. After a period, which varies in length, of complete freedom from vertigo, there is a second attack closely resembling the first, from which the patient again recovers. Thereafter he may be subject to recurrent attacks which render life miserable either by reason of their severity or by the sense of insecurity or of impending disaster during the interperiods of relief. Bárány mentioned to me cases of this sort coming under his observation. Such a clinical picture might be explained by the hypothesis of a very slowly progressive bone necrosis of some part of the bony capsule so situated as to produce more or less walling off of some portion of the labyrinth prior to the first characteristic vertiginous attack. Such a patient carries with him constantly the possibility of serious intracranial involvement with each successive attack. This condition would, in my opinion, be a most positive indication for the labyrinthine operation.

Vertigo in any suppurative lesion of the ear is always a symptom to be treated seriously. If due to a suppurative process confined to the tympanum or mastoid, and exerting an influence only indirectly on the labyrinth, the aurist's best judgment is required as to how, and particularly when, to deal surgically with a lesion which in recurrence may include the labyrinth. If the vertigo is clearly a result of labyrinthine infection, the need of sound surgical judgment is even greater.

In considering questions of treatment, we shall do well to bear in mind one fact which I have not seen stated in the literature of the subject, and which, from their writings and clinical reports, many writers have seemed wholly to ignore, namely, patients do not die of suppurative labyrinthitis per se. Those patients who die on account of this lesion invariably do so as the result of a secondary intracranial infection: meningitis, cerebellar abscess, or sigmoid sinus thrombosis. Operative technic is most important; it is not, however, the sole desideratum in dealing with the infected labyrinth. An operation, logical enough in intent, may carry overbalancing risks of causing that which it seeks to avert, that is, a spread of infection toward the meninges. There is also in suppurative labyrinthitis, more perhaps than in any other surgical disease, a period of greatest operative safety as also of operative risk.

There is no absolutely safe method of treatment; no rule of action which in the varying aspects of the disease may be relied on to save all its victims. In each individual case, surgical treatment must take account of the following several points: (*a*) immediate chances of recovery, that is, with and without operation; (*b*) possible influence of any operation in causing a spread of infection; (*c*) stage of the disease in which operative intervention is safest, and (*d*) ultimate risk to life if the labyrinthine focus of infection is not surgically eliminated.

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## VERTIGO DUE TO INTRACRANIAL DISEASE *

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There is no symptom more difficult to define on the part of the patient than vertigo, because this term is used to describe the slightest giddiness, falling sensation, epileptic aura or fainting spell.

Vertigo has been described as a feeling of discomfort arising from a disturbance of the relations of the body to space or a feeling of loss of balance. One of the best descriptions is by Hughlings Jackson, who described vertigo as a sensation of motor origin the result of a discord between the impressions which come from the labyrinth, the cerebellum, eye muscles and from other sources with which they coordinate or act in harmony. As the result of the discord of these impressions, consciousness is affected with a distressing sensation known as vertigo. Jackson rightly emphasized that this sensation is perceived through the cerebral hemispheres.

It would be important if it were possible to differentiate organic from functional vertigo from the clinical description furnished by the patient. To some extent this can be done, and yet mistakes are common. I knew of a patient suffering with vertigo who, for many years, was shown before medical students as a case of hysteria in the various medical institutions of Philadelphia, but who died from a cerebellopontile tumor growing from the eighth nerve, while, on the other hand, functional vertigo is frequently diagnosed as organic.

### VERTIGO IN INTRACRANIAL TUMORS

Tumors of the cerebral hemisphere do not produce dizziness unless there is considerable increase of intracranial pressure. Therefore vertigo appearing in cerebral tumors should at once arouse a suspicion of great increase of intracranial pressure, or of disease of the posterior cranial fossa.

Tumors or other lesions in the posterior cranial fossa nearly always cause vertigo either because of the direct involvement of the vestibular fibers or by indirect implication of these fibers through pressure. Slowly growing gliomatous lesions may directly involve the vestibular fibers without causing the slightest dizziness.

An attempt has been made by Grainger Stewart and Gordon Holmes to differentiate the forms of vertigo into, first, the sense of movement of self or surrounding objects; and second, an indefinite sensation, generally described as a giddy feeling. According to these authors, in intracerebellar tumors the external objects in front of the patient move from the side of the lesion to the opposite side, this being also true of the subjective rotation of self in intracerebellar lesion; but in in extracerebellar tumors the subjective rotation of self is from the healthy side toward the side of the lesion. These symptoms would be valuable in differen-

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tiation between intracerebellar and extracerebellar tumors, were they present in all cases; but in my experience this differentiation cannot be made, for in my own cases the sense of rotation of objects or self, while it has been present, has been always more or less indefinite.

In the second form of vertigo, described by Stewart and Holmes, the patient suddenly becomes dizzy, generally after some abrupt movement; the surroundings become dark, and there may be numbness or weakness in the extremities, associated with intense nausea and a tendency to fall backward or to the side of the lesion; consciousness may be impaired but never lost, objects may seem to swim or intermingle indiscriminately in front of the patient, and he may feel that if not supported he would fall in any direction, or collapse.

It would seem as if these indefinite feelings of giddiness should have the greatest localizing value because they may be present only when the head or eyes are deviated in a certain direction. Again, this indefinite sense of vertigo may be apparent only when the eyes alone are deviated toward the direction of the lesion.

I have selected examples of lesions in different localities as illustrations of the type of vertigo occurring in different kinds of cases.

### TUMORS OF THE CEREBELLOPONTILE ANGLE

An analysis of operative cases and of the tumors in the posterior cranial fossa in my laboratory gave very interesting results.

In a patient with a left cerebellopontile angle tumor growing from the eighth nerve involving the seventh nerve and the pons and cerebellum secondarily, the patient would not experience dizziness on looking to the right or on standing upright, but whenever he looked to the left suddenly he experienced a sense of dizziness and would feel as if objects were swimming on that particular side. Turning his head slowly would produce no sensation. In a case in which a tumor grew from the right middle cerebellar pedunole into the cerebellopontile angle involving the eighth nerve secondarily, the patient preferred to lie on the right side of his head, for when he sat up he felt dizzy. When sitting he would always lean forward and to the right, feeling more comfortable in this position. In another patient in whom a right cerebellopontile angle tumor invaded the pons and the cerebellum by pressure and in whom there was also involvement of the right fifth, seventh, eighth, ninth and tenth nerves, no vertigo whatever was present. In this patient there was entire absence of choked disc and of increase of intracranial pressure.

### TUMORS OF THE CEREBELLUM

In a patient aged 6 years, in whom a cyst was accurately localized and removed for me by Dr. George P. Müller, the cyst being on the right superior lateral lobe of the cerebellum, while the asynergy was very marked, vertigo was entirely absent. There was no increase of intracranial pressure.

In another patient in whom a gliomatous tumor was removed from the right cerebellum by Dr. Wayne Babcock, there were mild general pressure symptoms. This patient had dizzy spells associated with nausea and vomiting. He described the dizziness as a feeling as if everything were going from under him, and likened it to rolling down a hill and falling into a hole. When in bed he would have to lie on his face and then turn his head because he felt as if everything were dropping from under him. He would never put his head directly back in a barber chair, but first would have to turn on his side and then put his head back. If he did not do this he had a sensation that things were going around. He never felt as if he were going around the objects. Later on the dizzy spells would come on only when he was stooping over. In this patient, after a decompressive operation and removal of a certain amount of the brain tumor tissue, these symptoms promptly disappeared.

In another patient in whom there was found a tumor in the vermis and the right inferior lateral lobe, the symptoms began with an attack of dizziness which lasted for a day. Recurrent attacks would not last so long. During these she felt as if she were turning around, the head down, the feet up. These sensations were not constant, the intermissions lasting about a minute. Accompanying these attacks there would be at times nausea and vomiting. Gradually these attacks became less and less, and she felt dizzy only when turning her head to the right. She described these attacks as a feeling of dizziness between her eyes and over her eyebrows or a swimming of the head. She was free of these when on a level or turning her head in any direction excepting to the right. When she did so the dizziness started synchronously with the movement, and was most marked when the head was turned extremely to the right and instantly ceased when the median line was reached.

In another patient in whom postmortem examination revealed internal hydrocephalus of the fourth ventricle with pressure on the inferior vermis, the dizziness was described as a sensation as if the head were turning around from one side to the other. Objects in front of him never moved.

These descriptions of cases could be carried on indefinitely, but some conclusion can be reached from their study. It is apparent that there is no focal or recognizing value in the clinical description of vertigo furnished by the patient. It is also evident that vertigo or dizziness is present only in certain sets of conditions. First, there must be increase of intracranial pressure in which the vestibular fibers are indirectly implicated. Secondly, the lesion must involve the vestibular fibers directly and must be of such a character that the fibers are destroyed, for a slowly growing gliomatous tumor may not give any symptoms at all. Finally, the conclusion may be reached that vertigo in itself is not a focal symptom. Its presence or absence, however, helps in the diagnosis in the manner detailed above.

### FUNCTIONAL VERTIGO

It is generally known that certain organic cerebral conditions produce vertigo, the most frequent, of course, being arteriosclerosis. Besides, chronic cerebral anemia or hyperanemia and the bodily changes occurring in the climacteric frequently produce dizziness. It is hardly necessary to mention the fact that ocular palsies are frequently the source of vertigo. In a patient with a cerebellopontile tumor growing from the eighth nerve, the dizziness was extreme. There were also ocular palsies. Correction of the latter entirely removed the vertigo.

In my experience, however, dizziness is most commonly found in the nervous patient. Oppenheim believes that any one can bring on a feeling of vertigo by concentrating his thoughts on the process of loss of balance and by calling up the recollections of giddiness, which are familiar to every one. Neurasthenic individuals have this power in a still greater degree, and

in them fear and thought of vertigo are quite sufficient to produce it. In these patients, the nature of the vertigo can sometimes be told by the description of the patient, and of course also by exclusion. For example, in a patient with the fear of the presence of a cerebellar tumor, there is a feeling of swaying from side to side only when he reaches for an object, such as an instrument, and yet in the performance of the muscular exertion were he to touch an intervening object only slightly with the finger tip this swaying would disappear. He plays a very good game of golf and never has the slightest sensation when doing so, nor does he have this when he stands still. The fact is that in this man the fear of falling obtrudes itself into his consciousness to such an extent that the sense of dizziness or the fear of it is always imminent. Especially common is dizziness in the traumatic neuroses, when the head is injured. In practically all these cases dizziness disappears with settlement of litigation; but it cannot be said that the description furnished is characteristic any more than that the description is such as to put you on your guard against the possibility of its being labyrinthine in origin.

It should not be forgotten that neuroses often are associated with definite labyrinthine involvement, and in these cases the nature of the dizziness is exaggerated to an amazing degree. I saw such a patient with Dr. David Riesman a few months ago. This patient, a woman, aged 49, became dizzy at the age of 35. The dizziness was described as a sort of indefinite feeling within the patient which was chiefly marked when looking to the left. Ear examination by Dr. George MacKenzie was not satisfactory because of the sensitiveness of the patient, yet did not denote anything of an organic nature. For fourteen years this patient has tyrannized over her mother and two sisters, who have given up their entire time to attend to her. She never moves her head without bracing herself in a certain way and having these three devoted relatives help her move. She does not allow any one to walk in the room because she does not want to be jarred. She sleeps upright. Yet neurologic examination is entirely negative. When told by various neurologists and ear men that she has nothing organically wrong she promptly abuses them and tells them that they do not know their business. This probably is the most exaggerated case of this kind I have ever seen.

### EPILEPTIC VERTIGO

One of the most difficult differential diagnoses to make is between aural vertigo and the minor types of epilepsy, a distinction which is not recognized as frequently as it should be. There may be only a feeling of turning or uncertainness or an actual rotation which is either partial or complete, or there may be a sudden fall. Of course, aural vertigo can always be told from the minor epileptic type in the fact that in epilepsy there is nearly always a history of major spasms. For many years since my attention has been called to it, I have never failed to obtain a history of minor spasms, especially the psychic type, in every patient with epilepsy. This fact is not so generally recognized as it should be. The confusion arises in the fact that minor epileptic attacks often are accompanied by tinnitus, and there might be only a slight giddiness with not a complete loss of sensation.

Epilepsy and labyrinthine vertigo occasionally occur in the same patient. It must also be recognized that aural vertigo as well as epilepsy may occur during sleep. The cause must be referred to the instability of the center for equilibration.

### VALUE OF THE BÁRÁNY TESTS IN INTRACRANIAL LOCALIZATION

In 1913, with other neurologists, I attended the International Medical Congress in London and was impressed with the excellent work of Bárány and its value in cerebellar localization. On my return I was fortunate enough to induce Dr. Isaac H. Jones to take up this work. It is not necessary for me to point out the results achieved by Dr. Jones and his co-workers. Suffice it to say that there is no doubt in the minds of the neurologists fortunate enough to be associated with Dr. Jones of the value of this work. I myself am of the opinion that no neurologic examination of the posterior cranial fossa is ever complete unless advantage is taken of the data furnished by the Bárány tests.

I wish, however, to call attention to what I consider a rather dangerous deviation from the work as originally laid out. My remarks are not uttered in a spirit of criticism, for, as I have tried to emphasize, I have too high an opinion of the merits of this work; but in the interest of scientific accuracy I feel it necessary for me to state my views, although they may be in antagonism to those expressed by some of the previous readers of papers on this subject.

The fiber tracts leading from the labyrinth through the vestibular nerve into the Deiters group of nuclei and from there into the cerebellum, pons and cerebral cortex are by no means definitely known. Neither is there accurate evidence that there is a so-called vestibular center in the temporal cortex. While cerebellar localization has advanced in recent years, and incidentally the first localization chart in the human cerebellum was advanced by Dr. Mills and myself, yet this scheme of ours is by no means definitely proved, and has necessarily not been generally accepted and will not be until we have furnished more pathologic data. I make these statements because it is a mistake to assume that the fiber tracts are definite and that we know accurately their location. It at once becomes apparent that it is not possible by means of the ear tests alone to localize a tumor in a definite portion of the pons, cerebellum or medulla, or any of the constituent anatomic structures in which the vestibular tracts are located. It would be far better for the sake of scientific accuracy and for the future welfare of this work that whatever statements are made at the present time should be made in the most tentative manner, and not accepted until proved by accurate pathologic data. Take, for example, the posterior longitudinal bundle, which is an important part of the vestibular system. A great deal of work has been done, and yet many years of research have failed to tell us its component parts, and where this tract begins and ends; yet some of the workers in this field have assumed that these tracts contain certain vestibular fibers and that there is no doubt about their location.

Years of neuropathologic work have proved to me that it is very difficult to establish fiber tracts in any part of the nervous system. It has become necessary, therefore, to assume certain facts. This is right and is scientifically proper, for unless we exercise some scientific judgment and imagination, no progress can be made. It is right, therefore, to make assumptions from clinical evidence; but it must be understood that these are only tentative.

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# VALUE OF BÁRÁNY TESTS IN THE DIAGNOSIS OF VERTIGO, FROM WHATEVER CAUSE*

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Although it has been generally recognized for many years that vertigo may result from ear disturbances, the conception that all vertigo, from whatsoever cause, is peculiarly an ear study is the outcome of recent studies by Bárány methods. We have known that vertigo may be a symptom of disturbance in the ear, or within the brain, or may accompany refractive errors, or disorders involving gastro-intestinal, cardiovascular or renal systems. We therefore, up to the present time, have always classified vertigo according to its apparent etiology, calling it "gastric" vertigo, or "renal" vertigo, or falling back in obscure cases on the old reliable diagnosis of "idiopathic" vertigo. The very vagueness of such a classification shows that we have had no real conception of the actual mechanism that is responsible for dizziness. However, if by a study of the vestibular apparatus we come to realize that it is this balance mechanism that keeps us from being dizzy, we become convinced that vertigo is impossible unless there is an irritation, impairment or destruction of some portion of this "vestibular apparatus," by which we mean the internal ears and their intracranial pathways. The ear tests enable the otologist to study the integrity of each and every part of this mechanism. Therefore, dizziness need no longer be regarded as something vague and mysterious. It becomes a distinct clinical entity and may be intelligently studied.

To be sure, the ear-tests do not furnish absolute, final and complete information as to everything whatsoever that has to do with vertigo. For example, by ear study, we are not able to tell whether the source of a toxemia has been in the kidneys, or the gastro-intestinal tract, or in a focal infection. These tests, however, open up a definite method of approach in this most obscure field, and furnish the possibility of accurate diagnosis and intelligent treatment. Have we, in fact, any other method of attacking this problem except by the ear-tests? Surely any opinion based on history or analogy or empiricism is at best merely a conjecture.

The tests themselves are best presented by the moving pictures. The first reel demonstrates the normal responses in normal persons. [Moving pictures were shown, presenting the American modification of the Bárány chair; the technic of the turning and caloric tests, showing the necessity of putting the head in certain definite positions in order to stimulate certain definite semicircular canals; and the demonstration of normal responses, in nystagmus, past-pointing and falling, after stimulation of the various semicircular canals.]

The nerve pathways from the ear to the eye-muscles and the nerve pathways from the ear to the cerebral cortex, with their branches and subdivisions, constitute our conception of the "vestibular apparatus." As the vestibular portion of the internal ear is essentially the *sense-organ* of this apparatus, we may properly speak of the apparatus as the "ear mechanism." It is the disturbance of this mechanism, and only the disturbance of this mechanism, that produces vertigo. When this ear-mechanism functionates normally, perfect equilibration is the result. If for any cause, immediate or remote, there occurs a disturbance in this mechanism, vertigo is the result.

Dr. Lewis Fisher and myself have attempted to classify under separate headings the various types of conditions that can produce vertigo. We take this opportunity to submit the following classification:

1. Involvement of the ear-mechanism by a lesion in the ear itself.

2. Involvement of the ear-mechanism by a lesion involving the intracranial pathways from the ear.

3. Involvement of the ear-mechanism by ocular disturbance, either through the eye-muscle nuclei, or through association fibers from the cuneus to the cortical terminus of the fibers from the ear, in the posterior portion of the first temporal convolutions.

4. Involvement of the ear-mechanism by cardiovascular disturbance.

5. Involvement of the ear-mechanism by toxemias from any organ or part of the body.

So far as our present knowledge goes, this classification includes all the causes of vertigo.

It is to be noted that regardless of the cause, vertigo is due to the involvement of the ear-mechanism. Let us discuss the causes seriatim:

1. Lesions in the ear itself have been completely presented by Dr. Shambaugh and Dr. Kerrison in this symposium. They have shown that a lesion of the vestibular portion of the internal ear produces dizziness, staggering, nausea, vomiting and perhaps diarrhea, just as an affection of the cochlea produces noises in the head. The general practitioner is familiar with the significance of tinnitus and recognizes that he is dealing with an ear condition. When confronted, however, with vertigo, nausea and vomiting, it is questionable whether, at the present time, the physician is apt to suspect the ears as the possible cause of all these symptoms. This, of course, is due to the newness of this study. When we realize that we otologists have come to recognize the importance of the vestibular labyrinth only in the last decade, it is only natural that the physician has not had his attention sufficiently called to the phenomena of internal ear disturbance. When a physician sees a case of vertigo, one of his first thoughts should be of the ear itself.

2. Lesions within the brain, such as tumor, hemorrhage, thrombosis, infarct, abscess, gumma, tubercle, specific neuritis, multiple sclerosis, syringomyelia, poliencephalitis or meningitis, produce vertigo by affecting the intracranial pathways from the ear. Dr. Weisenburg has made this clear to us in his part of this symposium.

The value of ear-examination in the differential diagnosis between lesions in the ear and lesions in the brain is best illustrated by citing two cases. In one case the history and symptoms indicated a lesion of the ear, and yet it turned out to be an intracranial lesion. In the other case the history and symptoms indicated on intracranial lesion, and yet it turned out to be a lesion in the ear.

CASE 1.—J. B. K., man, aged 39, in September, 1914, as he stepped off a train, was suddenly seized with violent vertigo, nausea and vomiting. The vertigo was so severe that he fell to the platform and was taken to the hospital, where he was confined to bed for ten days, during which time the vertigo gradually diminished. There was coincident complete deaf-

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ness in the right ear. Here we have the typical classical picture of the so-called "Ménière's disease"—a sudden hemorrhage into the internal ear. Yet it turned out to be a beginning tumor in the right cerebellopontile angle, from which the patient died in seven months.

CASE 2.—Mrs. Agnes G., aged 44, in July, 1914, suddenly began to have difficulty in walking, and in September had severe attacks of vertigo, nausea and projectile vomiting. The diagnosis of brain tumor was made, and neurologic consultants found that the symptoms and tests suggested that the tumor was in the right cerebellar hemisphere. This diagnosis was confirmed by the Roentgen-ray report, which stated that it was a cyst in the right cerebellar hemisphere. The surgeon was about to operate, but hesitated because the ear examination suggested that the lesion was in the right labyrinth and because the cerebellum appeared normal. (The past-pointing after ear-stimulation was normal—both arms past-pointing properly both to the right and to the left.) The patient had an uninterrupted convalescence without operation, has given birth to a healthy child, and has remained in excellent health ever since (a period of two and one-half years).

One thing cannot be too strongly emphasized—we otologists do not attempt to make a diagnosis of intracranial conditions. When an ear-examination suggests that we are dealing with an intracranial condition, we recognize that we are obviously beyond the field of otologic study, and immediately feel the need of a thorough examination by a neurologist to whom such a case properly belongs. The ear-examination, like the eye-examination, simply furnishes information of value to the neurologist. It is the neurologist who alone is fitted by his training to draw conclusions from all the data, including the ear-examination.

3. Ocular conditions producing vertigo are naturally best studied by the ophthalmologist. If the ear-tests fail to show any impairment of the ears or their intracranial pathways, an eye examination is indicated. Many cases of vertigo are cured by correction of ocular defects. This happens so often in the experience of ophthalmologists that many seem to be convinced that the eye is the most important organ to study in cases of vertigo. Surely, however, the eye is not the organ of balance. If you destroy the eye the individual becomes blind, but he does not become dizzy. On the other hand, we all know how destruction of the internal ear, or simply the slightest irritation of the internal ear, produces violent vertigo and disturbance of equilibrium.

4. Cardiovascular irregularities may produce vertigo by causing ischemia or hyperemia of any part or parts of the ear-mechanism—either within the internal ear itself or its intracranial pathways, or in its associated centers in the cerebral cortex.

5. Toxemias affecting the ear-mechanism may be grouped into two classes:

(*a*) Evanescent toxemias which have produced no degeneration of the cellular elements within the internal ear or its intracranial pathways.

(*b*) Toxemias which have produced a definite impairment of some portion of the ear or its pathways.

The cases of evanescent toxemia constitute a very large proportion of the cases of vertigo that are seen by the physician. The simplest illustration of this type of vertigo is the dizziness produced by the ingestion of alcohol. The mere presence of alcohol in the stomach does not produce vertigo. It is only when the alcohol reaches the ears and the brain that the person becomes dizzy.

CASE 3.—Mrs. Van S., aged 32, had no symptoms ascribable to her ears, but was referred by Dr. McGlinn because she complained of vertigo. In October, 1913, she woke up one morning with a violent attack of vertigo, accompanied by nausea, vomiting, retching and diarrhea. The attack suggested ptomain poisoning in every particular except that there was no pain in the abdomen. These symptoms continued for forty hours, and then the patient improved progressively for the following four days. On the fourth day she was out of bed and apparently had entirely recovered, but on bending over to kiss her boy she suddenly felt that she was plunging forward through a door. This second attack lasted another day. Gradual improvement followed, so that at the time of the ear examination, ten months later, she stated that she noticed vertigo only when she lay down at night. In October, 1914, she woke up one morning with the sensation that the bed was falling over. This attack, like the others, gradually diminished in severity after a few days. Between attacks she merely noticed that when she went to bed at night it took about half an hour to go to sleep, because she felt a little dizzy, and she could not sew or read because it made her dizzy.

Examination of the ears revealed normal cochleas, normal semicircular canals, and normal pathways from the ear throughout the brain. The diagnosis suggested under these circumstances was that we were dealing with a purely functional neurosis, or with a mild toxic irritation of the internal ears. On receiving this report, Dr. McGlinn recognized that the probable source of this toxemia was a pyuria due to pyelitis and an associated cystitis. Under the vigorous use of hexamethylenamin, the pyuria was markedly improved. Dr. McGlinn noted distinctly that when the pyuria was least marked there was practically no vertigo. During the past year and a half the patient has been practically free from either the pyuria or the vertigo. In the past few days, however, the pyuria has returned, and with it the vertigo.

Toxemias which produce a definite impairment of the internal ears include the powerful toxins, such as in mumps or syphilis, and also the repeated assaults of a milder toxin, such as those from the gastro-intestinal tract or from a focal infection.

CASE 4.—Mrs. W., aged 58, had her first attack of vertigo in 1897. It lasted only a few minutes. She had three or four such attacks during the next fourteen years. A severe attack in 1911 occurred while she was walking along the street. These attacks came on at irregular intervals. In October, 1915, a severe attack occurred while she was sitting in the theater, and she was taken to the hospital, where she remained for seven days. Because of the attacks of nausea, vomiting, diarrhea and emaciation, a diagnosis was made of gallbladder carcinoma. Operation, however, showed the gallbladder to be negative. Subsequent ear examination made it perfectly plain that all her symptoms had been due to recurrent attacks of labyrinthitis. Her physician, Dr. Robert L. Pitfield, has noted that when she eats fish or eggs she has a marked gastro-intestinal disturbance and that the vertigo accompanies this disturbance. Under dietetic treatment she has recovered, and at the present time is in excellent health.

CASE 5.—Miss C. H., aged 27, was referred by Dr. Francis Packard, who felt it advisable to remove the pathologic tonsils, but hesitated to do so because the patient had complained of severe and continuous vertigo for a period of over six months. This dizziness was almost continuously present. It made no difference whether she was lying down or standing. Occasionally at night the vertigo would be so severe as to wake her from a sound sleep. For the previous year or two the patient had noticed that when going up or down in an elevator she would almost faint. Six months ago, however, the definite vertigo began, and there appeared at the same time "an appearance of an eruption just under the skin." She had always had exceptionally good health until this skin eruption and vertigo commenced. The report of the ear examination read: "There is no evidence of any intracranial involvement along any of the pathways from the ear. There is a proportionate impairment of nystagmus, vertigo and past-pointing, indicating a slight impairment of function of the vestibular portion of the right labyrinth. The diagnosis suggested is a toxemia which has affected the internal ears at

intervals, thus producing the vertigo; the condition is in no sense serious. If the toxemia can be eliminated, it is probable that she will have no more attacks of vertigo." Dr. Packard removed the tonsils. In a few days there was a complete disappearance of the vertigo, and the skin eruption also disappeared at the same time.

CASE 6.—H. H., man, aged 42, was referred by Dr. Vincent Lyon with a history of an attack, nine months before, of acute articular rheumatism involving almost all the joints. At the time, the patient was confined to the hospital for seventeen days, and after leaving the hospital continued to have occasional recurrences of the involvement of the joints. Three months after the original attack, the patient began to complain of vertigo and staggering, and was referred for an examination of the ear in the attempt to discover the cause of the vertigo. The ear report read: "Examination shows a distinct impairment of both internal ears, in both the cochlear and vestibular portions. This suggests that a source of toxemia must be searched for. It may be that the same toxic substance that causes his joint involvement may also have caused this toxic labyrinthitis." Roentgenoscopy revealed abscesses at the roots of two teeth. These abscesses were drained by the removal of these two teeth. Within a week the patient ceased to have any vertigo or staggering, and also all the rheumatic symptoms entirely disappeared. That the removal of the focal infection at the roots of the teeth cured this patient entirely of all his symptoms makes it strongly suggestive that this focal infection was responsible for his entire illness. The toxemia, on the one hand, had involved the joints, and, on the other hand, had involved the internal ears, thus producing the vertigo and staggering.

These varied conditions that produce vertigo may be illustrated by the moving pictures. [Moving pictures were now shown, consisting of cases of different types of involvement of the labyrinth, including fistula from chronic middle ear suppuration; syphilitic neuritis of the eighth nerve; lesions of medulla oblongata and pons, including tumors, poliencephalitis and multiple sclerosis; lesions of cerebellum, including cases in which tumor has been removed with recovery; and cerebellopontile angle tumors, with necropsies.]

In conclusion, in any given case of vertigo the first thing to be done is to examine this ear-mechanism which is responsible for the vertigo. One thing we know positively—the tests will show either abnormal or normal responses. If the responses are abnormal, the tests will help to locate the point of the disturbance, either within the ear itself or along its pathways within the brain. If the responses are normal, we have then narrowed down the diagnosis to (1) a purely functional neurosis; (2) ocular disturbance, or (3) an evanescent toxemia, the source of which must then be searched for.

Therefore, just as we examine the urine in nephritis or diabetes, or as we have a Wassermann test made in cases of suspected syphilis, just so by the ear-tests we can analyze the apparatus responsible for dizziness. Only rarely does a "dizzy case" remain obscure after these ear-tests, and in most instances the diagnosis becomes clear and simple.

Medical Arts Building.

## ABSTRACT OF DISCUSSION

### ON PAPERS OF DRS. SHAMBAUGH, KERRISON, WEISENBURG AND JONES

DR. H. T. PATRICK, Chicago: I should like to ask Dr. Jones whether he has performed the Bárány tests on a man with alcoholic vertigo, drunk enough to stagger, and if so, what the results were.

I venture mildly to take issue with Dr. Shambaugh on the point that vertigo is due to a toxic or degenerative neuritis in the vestibular nerve. Vertigo is essentially a paroxysmal affection. If there be such a thing as continuous vertigo, compared to a continuous tinnitus, it may be due to neuritis; but that the vertigo which comes on suddenly, lasts a few seconds, a few minutes or a half hour, should be due to a neuritis is repugnant to my neurologic training. Neuritis of a motor or a sensory nerve is a continuous condition—of irritation or the lack of conduction. There is pain or lack of sensation. The pain of a neuritis is a continuous pain; it is not a paroxysmal pain, not at all like tic douloureux, or facial neuralgia, which is essentially paroxysmal. The focal infections, which are so frequent, rarely cause neuritis; they cause arthritis. Most of the cases of such origin, supposed to be neuritis, notably brachial neuritis, sciatic neuritis, intercostal neuritis, are not neuritides at all; they are cases of arthritis of the shoulder, hip, and the joints of the spinal column. The neuritis of infection or intoxication is generally a multiple neuritis, though occasionally it is local. In either event the symptoms are not paroxysmal.

I believe that Dr. Weisenburg's caution is essentially apropos. We must draw definite conclusions with great circumspection. For instance, I recently held a postmortem on a young girl who had lost practically one half of her cerebellum with a cyst that had penetrated the pons beyond the middle line, so that the cyst on the right side caused a facial palsy on the left, and yet she never had a particle of vertigo. The question of vertigo in the neuroses is one of great interest and practical importance. The most important thing is that neuroses cause no vertigo. There is a sensation of dizziness, but it is not vertigo at all. In the neuroses there is apprehension and doubt, a feeling of great uncertainty, and definite phobias, constituting a kind of emotional vertigo. The patient has a feeling that he is going to fall, that he is going to stagger, that he has to hold to a person or piece of furniture to keep from falling. In fact, they do often hold on with a vigorous grip. But they really have no vertigo. These patients do not need investigation of the labyrinth. They need investigation of the personality in its widest sense.

DR. WELLS P. EAGLETON, Newark, N. J.: As otologists we must realize that the majority of patients with cerebellopontine angle involvement present themselves early in the disease because of ear symptoms, and frequently they have been treated for many months, and sometimes for years, for progressive deafness or for slight vertigo, before outstanding neurologic symptoms appear.

As to brain abscess, I am persuaded that every case of suppurating ear that gives any cerebral symptoms whatever should have a thorough functional test, as light may thus be had during the early stages of a brain abscess. Examination of the reported cases of brain abscess show that very few have been diagnosed early enough to give a proper chance of recovery, and this largely for the reason that in spite of suppuration of the middle ear, the functional tests that we now have have not been systematically and repeatedly followed while the patient was in condition intelligently to cooperate in their application.

Regarding neuroses, a large number of people come to us complaining of a sensation of dizziness. Sir Victor Horsley called attention to the frequency with which perversion of the sexual act causes a sensation of vertigo; in my experience this has been a common cause, and when a patient comes in complaining of a roaring in the head and vertigonous sensation, it has been my routine to question him regarding this, with the result, when present, that correction of this vice will promptly cure the vertigo.

As regards increased intracranial pressure, the systematic application of the cold caloric furnishes the otologist with the means of its early diagnosis, which may be as important as the papilledema of the ophthalmologist. In cerebellopontine angle tumors the increased intracranial pressure interferes, in a large proportion of cases, with the nystagmus and vertigo normally induced by the cold caloric of the unaffected side; when applied in the upright position the nystagmus is absent and no sensation of vertigo is elicited.

The fixation apparatus to which Dr. Jones referred is an instrument to be condemned. With the fixation apparatus, even if directly in front of the patient, there must be some

convergence, which inhibits more or less the normal reflex. Furthermore, in looking for evidence of nystagmus to the right with the apparatus in the side positions, as recommended by Bárány, the nystagmus is increased to the right when looking to the right, and diminished when looking to the left. Purely vestibular nystagmus should be studied with the patient looking straight ahead and at some distant point. I have done quite a little work with Alexander's modification of the von Stein goneometer motor, and had excellent results with it. Dr. Breen's modification has a support where the patient can put his heel. In the tests that I made, the patient's feet were bared and a little rosin used to prevent slipping. I was able by careful technic to obtain constant results in all positions.

Dr. Weisenburg pointed out that we may have vertigo without nystagmus, which is true; so, too, may we find nystagmus without vertigo; furthermore, we may find nystagmus, vertigo and past-pointing in a purely ocular condition — in those conditions in which there is a paresis of one of the extra-ocular eye muscles, pointed out by Stewart long ago, and quoted again by Panse in his monograph on "Schwindel." So in cases of doubt or even in mild cases, every possible source should be studied before coming to a positive conclusion that the nystagmus and vertigo are of vestibular origin. Vertigo may occur, as pointed out by Dr. Weisenburg, in cases of tumor in any part of the brain, provided there is sufficient pressure, especially if the pressure has been brought about within a reasonably short space of time. Recently I had a case of the kind. There was a large cyst in the frontal lobe. The patient had no vertigo, but he did have an excessive degree of physiologic nystagmus, while the two sides reacted excessively promptly to galvanism. Dr. Weisenburg mentioned one case in which Dr. Jones had given a patient considerable distress from testing, and I have seen such cases. One of the nicest and easiest things to do, if one has a neurotic patient, is to try the galvanic test. That is not so distressing to the patient as turning, since a normal reaction is obtained with three to five amperes, manifested by nystagmus without vertigo. The patient is not made sick with it.

DR. LEWIS FISHER, Philadelphia: In analyzing the findings of an ear examination one is guided by the following: 1. If stimulation of the labyrinth produces perfectly normal responses, both vertigo and nystagmus, there is evidently no impairment of the vestibular apparatus, and the vertigo is produced by something irritating the apparatus. 2. If stimulation of the labyrinth fails to elicit any responses whatever, the trouble is in the labyrinth or the eighth nerve, because that is the one place where one lesion would interfere with all of the reactions. 3. If a patient shows nystagmus and no vertigo, or vertigo and no nystagmus, such a lesion is not labyrinthine. An experience with many pathologic cases naturally teaches us to regard certain "phenomena-complexes" as meaning a lesion of a certain type and we are impelled to suggest occasionally a diagnosis. For instance, when ear findings show a nonreacting ear, with deafness on one side, with an absence of responses to stimulation of the vertical semicircular canals of the opposite side, we immediately recognize that all the cerebello-pontile tumors we have examined give just such findings, whereupon we do not think that we are presuming too much when we suggest to the neurologist that he is perhaps dealing with just such a lesion. To sum up, the otologist does not attempt to make a pathologic diagnosis; his function is to furnish information of which the neurologist may or may not avail himself as he pleases.

DR. E. L. MYERS, St. Louis: I work in a dispensary where we have about fifty cases a day, and the case that I am about to report has some relation to the Bárány test. A boy had been sent in by the school physician for a disturbance in his vision. This boy had a nystagmus which could be brought out by closing one eye and asking him to fix laterally. The boy could see absolutely perfectly and had no nystagmus when he was looking straight ahead, but the moment he closed the left or right eye, he showed equal nystagmoid movements with the unclosed eye. He was examined by neurologists and serologists, etc., but they could not make a definite diagnosis as to the cause. Dr. Max W. Jacobs of St. Louis says that this is one of a few such cases reported. If Dr. Jones will help me out by explaining it, I will be obliged to him.

DR. NORVAL H. PIERCE, Chicago: What was the character of that nystagmus?

DR. E. L. MYERS, St. Louis: It was what I would consider a true spontaneous nystagmus. The motion would be one way at one time, but if the eye was turned to the other side, it would be the other way. The boy said he was afraid to walk on joists, and that when he stood on a street coping he had a sense of dizziness.

DR. GEORGE F. KEIPER, Lafayette, Ind.: I wish to emphasize the point brought out by Dr. Weisenburg with reference to the rotation test. I formerly was enthusiastic about this test, and then I saw several patients who were made worse after it. We ought not to make a rotation test with any person until we have given him a thorough physical examination, investigating all the details with reference to the organs, and then making an examination of the eyes. The examination of the eyes is important. I should like to ask Dr. Jones whether the patient with the insensitive cornea had glaucoma. Glaucoma sometimes produces vertigo.

DR. ISAAC H. JONES, Philadelphia.: It was a benign tumor.

DR. PHILIP D. KERRISON, New York: I wish to ask Dr. Weisenburg if in his opinion a tumor in the cerebellopontile angle would invariably cause vertigo; in other words, was the development of such a tumor with complete absence at all times of vertigo clinically possible?

DR. A. A. HAYDEN, Chicago: Dr. MacKenty spoke of electrical tests. There are three tests, the caloric, the turning and the electrical. I understand the latter is the least pleasant and least reliable. I should like to ask Dr. Jones to elaborate on this in his closing remarks.

DR. GEORGE E. SHAMBAUGH, Chicago: I wish to emphasize the following points: First, the most frequent cause for vertigo is disturbances in the internal ear, and of these internal ear conditions the most common is a progressive degenerative process which can readily be demonstrated by our functional tests. The second point is one which was brought out clearly in this symposium and in recent years is becoming more and more recognized by the specialists. This is that the work in any special field requires close cooperation between the specialist and men working in other lines of medicine. In this particular field the neurologist is our companion, but in many of our cases the internist is the one from whom we get the greatest assistance. I am convinced that we have already a very satisfactory basis for making a differential diagnosis between vertigo which is the result of disease processes in the internal ear, and vertigo which is caused by some intracranial disturbance.

I am glad to hear from Dr. Patrick definitely why he finds it difficult to accept the conclusions expressed in my paper, that the chronic degenerative processes in the internal ear which cause so many cases of vertigo may be the result of changes due to chronic focal infection. This objection expressed by Dr. Patrick, as I gather it, is that neuritis as the result of focal infection is a process which runs a more or less chronic course, whereas, in these cases of vertigo the disturbance is almost always temporary. Dr. Patrick's difficulty lies in the fact that he has failed to grasp the significance of the symptom of vertigo. Vertigo is always a temporary affair and even when it is the result of a sudden, complete destruction of the function of the internal ear, the vertigo lasts a very short time, at most a few weeks. Vertigo is never caused by a slowly progressing process which is destroying the function of the internal ear. Its presence always indicates a sudden acute exacerbation of this process. Now, as a matter of fact, in the cases referred to in my paper there is going on in the labyrinth a chronic, progressive degenerative process which is not a temporary affair, but is exactly like the chronic degenerative neuritis such as involves the optic nerve in cases of focal infection. The symptom of vertigo arises in these cases only when there happens to be an acute exacerbation, and then only when this acute process involves the vestibular part of the ear.

DR. THEODORE H. WEISENBURG, Philadelphia: In regard to Dr. Kerrison's question, I have seen a number of instances of tumors of the cerebellopontile angle without vertigo, but in these cases the eighth nerve was not involved pathologically.

Regarding Dr. Fisher's comments, I only wish to emphasize that the future advances in this work will altogether depend on the coordination of those interested and the neurologists, because the latter are chiefly concerned with it. It is necessary to go slowly in assuming that the anatomic data are indisputable, until that is definitely proved by pathologic work. I am glad to say that such coordination is not only possible, but is actually going on in Philadelphia.

DR. ISAAC H. JONES, Philadelphia: Dr. Patrick has asked about the effect of alcohol on the internal ear. Those enthusiasts in Vienna who started the studies of the labyrinth made it a point to test individuals who were intoxicated. The turning and caloric tests produced *hyperactive* responses in nystagmus, past-pointing, vertigo and falling, and especially in nausea and vomiting. Alcohol unquestionably produces a hyperactive condition within the labyrinth.

In regard to the case of spontaneous nystagmus the etiology of which is obscure, it is possible that this case may be cleared up by means of the ear tests. It is in just such obscure cases that the ear tests are of value.

## ACUTE ASCENDING TOXIC (OR DEGENERATIVE) MYELITIS

### REPORT OF A CASE WITH NECROPSY FINDINGS

JULIUS R. GLOBUS, M.D.
NEW YORK

This is an extremely rare disease, and there are only a few cases on record. In some cases the exact nature of the condition has probably been overlooked, and they have gone on record by the name of the similar and somewhat more common disease known as Landry's paralysis. But the clinical picture, and to a certain degree also the histologic findings, in these two allied conditions are so different and distinct, that there should be no difficulty in classifying them as two entirely separate diseases.

### REPORT OF CASE

*History.*—L. W., a man, aged 31, white, born in the United States, a bricklayer, was admitted, May 3, 1917, to Dr. C. E. S. Webster's service. The patient was well developed physically and well nourished. He had never been sick before, except for measles in early childhood. The family history was negative. He drank and smoked moderately. There was no history of sexual excesses, exposure or trauma. Syphilis and gonorrhea were denied. On the night before admission, he came home slightly under the effects of alcohol, but apparently well otherwise. When awakening next morning he found himself helpless to such a degree that he could not even change his position in bed. Both upper and both lower extremities were found in a condition of complete flaccid paralysis, with the exception only of the fingers of the right hand, which he could move slightly, but which were also found paralyzed a few hours later. He could, however, move his right shoulder until a few hours previous to his death. In addition, all the muscles of the trunk were paralyzed, and breathing was purely diaphragmatic.

*Course.*—The neck showed slight rigidity, but the patient could move his head in all directions, although these movements were slightly painful; otherwise there was no pain anywhere. The face was pale in the beginning and became flushed with the rise in temperature. The pupils were moderately dilated, equal, and reacting to light and accommodation. Nothing abnormal was found about the heart or lungs. The liver and spleen were not palpable. The bladder was very much distended, and on catheterization 73 ounces of urine were obtained. The bowels were obstinately constipated. All reflexes were gone.

Sensation was completely lost in both lower extremities and trunk, and very markedly diminished in both upper extremities; it was only slightly diminished, if at all, in the lower part of the neck.

The patient's temperature on admission was 95 F. The pulse was 60, and respiration 24. The patient was given strong hot coffee, a hot enema and plenty of external heat. The temperature was going up gradually, and in seven hours reached 97.5 F. Pulse was 100 and respiration 26. Four hours later the temperature was 100, pulse 120 and respiration from 26 to 30, and remained at this height until death.

The patient was fully conscious, and his mind remained perfectly clear throughout the illness. He was quite comfortable until the last hour, when he apparently began losing control over the muscles of articulation and deglutition.

When he had been in the hospital for twenty-seven hours (and between thirty-six and forty-two hours after the onset of the disease) the patient became suddenly deeply cyanosed and died in a few minutes, from respiratory paralysis.

The urine showed a faint trace of albumin, but otherwise was negative.

The blood count revealed 12,000 white cells, 82 per cent. polymorphonuclears, and 18 per cent. small lymphocytes.

Lumbar puncture gave 35 c.c. of perfectly clear, colorless fluid under pressure, with sixty cells per cubic millimeter; negative globulin and positive sugar. Smear and culture revealed no organisms. The spinal fluid Wassermann test was negative.

*Necropsy.*—This revealed the medulla, cervical cord and upper dorsal very soft and spongy throughout, and the cord congested in the anterior portion. There were no changes in the brain. The spleen was somewhat enlarged and congested. There were no changes in any of the other organs.

Histologic examination revealed the general topography of the cord not altered. The spinal meninges were normal, except for a slight dilatation of the blood vessels. Round cell infiltration was absent.

The gray matter of the cord showed vacuolation of the anterior horn cells, which in certain areas had proceeded to fragmentation of the cell. There was a generalized edema of the anterior horns, the edema extending to the posterior horns. The blood vessels were markedly dilated, and not surrounded by round cell infiltration. The changes outside the gray matter consisted of a general edema of the nerve fibers and supporting neuroglia, with absence of round cell infiltration.

Sections of the medulla showed, as the only demonstrable histologic change, a generalized edema with absence of hemorrhage, round cell infiltration, or other evidence of inflammation.

### COMMENT

It is clear that this case belongs to the group of diseases which are often known under the general term of acute ascending paralysis, the other members of this group being Landry's paralysis and acute anterior poliomyelitis (especially the fulminant type). But it differs from the others clinically by the loss of sensation, there being either no change in sensation at all in the two others, or hyperesthesia, if any, and complete absence of pain, this element being present to a certain degree in Landry's paralysis — pain in the back and tingling and cramp like pain in the extremities — and still more marked in poliomyelitis.

Pathologically, we meet here a condition of acute degeneration of the nerve elements and neuroglia with nearly complete absence of inflammatory changes, as adventitial and perivascular cell proliferation, which differentiates it from acute poliomyelitis, as well as from inflammatory or infiltrative myelitis, while true cases of Landry's paralysis present practically no changes either gross or microscopically, with the exception of slight edema and some general hyperemia of the cord.

Lincoln Hospital and Home.

## Special Article

# MODE OF INFECTION, MEANS OF PREVENTION AND SPECIFIC TREATMENT OF EPIDEMIC MENINGITIS *

SIMON FLEXNER, M.D.
NEW YORK

### SERUM TREATMENT

(*Concluded from page 725*)

*Mode of Administering the Serum.*—In practice the first dose of the serum is injected without delaying until a positive culture result or even a positive microscopic film is obtained. The clinical signs having aroused suspicion that the case may be one of epidemic meningitis, lumbar puncture is performed. A fluid at all turbid is taken to be presumptive evidence of meningococcus infection. A fluid quite clear arouses doubt. But in the latter instance, immediate centrifugalization and microscopic examination of the sediment may show beginning leukocytosis, and the application of the Noguchi test[20] excess of globulin. Those findings indicate an inflammatory process. The latter test may be carried out while the lumbar puncture needle is in position, as may also the microscopic examination of a film stained by Gram's method in order to reveal gram-negative micrococci, presumably the meningococcus, within or outside the leukocytes.

The disease having, through bacteriologic examination of the cerebrospinal fluid or nasopharynx, been shown within another twenty-four hours to be definitely or with a high degree of probability epidemic meningitis, the subsequent course of treatment will be determined by its severity and progress.

The steps, therefore, are as follows: Diagnostic lumbar puncture, the results of which arousing suspicion, is followed immediately by the injection of 30 c.c. of the antimeningococcic serum in adults and corresponding doses in children. The cases having been proved by bacteriologic examination to be epidemic meningitis, two or three additional doses are administered at successive twenty-four hour intervals, irrespective of any favorable outlook, unless there arise definite indications to the contrary. The purpose of the three or four successive doses is to guard against relapse when the symptoms seem to yield completely to the first injection or two of the serum. The number of injections required by a case of average severity is from four to six.

When the onset is more violent or the case has come under observation at a later stage, the procedure is the same, except that it may be advisable to repeat the injection at twelve hour intervals on the first day and even afterward. The number of doses of serum required for this class of case averages from six to ten. Not a few cases have terminated in recovery when very protracted; and instances are reported in which 1 liter or even more of the serum has been injected into the membranes in doses ranging from 30 to 60 c.c. before the infection finally yielded. The prolonged course results from repeated relapses or reinfection of the meininges arising from some protected focus of multiplication of the meningococcus not freely reached by the serum. This condition may be due to late or to inadequate treatment, but has been known to appear in spite of vigorous and even early beginning of the serum injections.

In instances of which very few have been reported, the meningococcus induces a general blood infection without concomitant changes in the cerebrospinal fluid. Intravenous injections of the serum in doses of from 40 to 60 c.c. are indicated and have been successfully employed.

The maximum dose of the serum is not 30 c.c. In very severe or in protracted cases, quantities of 40 and even 60 c.c. may be administered. The massive quantitives have been known to bring about an arrest of the infection in certain cases which were not responding well to the smaller doses. It is, however, the exceptional case in which the larger doses are required.

The administration of the serum should be continued until the temperature has fallen to and continues at normal for two or more days; but as in some cases the cerebrospinal fluid becomes clear of meningococcus and even of inflammatory cells and the obvious symptoms abate, although the temperature still keeps above normal, it is desirable to interrupt the injections of the serum and to observe closely the effects under the latter rather unusual circumstances. If the serum is too abruptly discontinued without taking account of the general symptoms and local conditions, the probability of relapse is increased.

Withdrawal of cerebrospinal fluid always precedes the injection of the serum, and it is advisable to remove a volume of the fluid greater than that of the serum injected. Not infrequently from 50 to 60 c.c. of the fluid may be withdrawn. Some physicians of experience prefer always to perform lumbar puncture in adults under general anesthesia. Certain patients are very sensitive to the puncture and apprehensive of it, and the introduction of the serum is sometimes attended with severe pain in the buttocks radiating down into the legs. Moreover, under the semi-asphyxial condition induced by the anesthetic, the pressure in the cerebrospinal fluid rises and a more voluminous outflow is obtained. Quantities of the fluid of from 70 to 100 c.c. may thus be removed. Younger persons and young children especially mind the puncture much less.

And yet it is doubtful whether a general anesthetic should be resorted to except in special instances; in very sensitive patients a local anesthetic may be advisable.

The mere withdrawal of a quantity of cerebrospinal fluid with its contents of multiplying and

* From the Laboratories of the Rockefeller Institute for Medical Research.

* As the subject matter of this article is of timely importance, the reprints have been prepared in advance of the publication in THE JOURNAL, and can be had by sending a stamped, self-addressed envelope to this office or to the author.

20. Two parts of the cerebrospinal fluid to be examined are mixed with 5 parts of a 10 per cent. butyric acid solution on physiological salt solution and are heated over a flame and boiled for a brief period. One part of a normal solution of NaOH is then added quickly to the heated mixture, and the whole boiled once more for a few seconds. The actual quantities of these three agents preferred are 0.1 or 0.2 c.c. of the spinal fluid, 0.5 c.c. of the butyric acid solution, and 0.1 c.c. of the normal sodium hydroxid. It is necessary to take the precaution to employ for this test only cerebrospinal fluid entirely free from blood. The presence of an increased content of protein in the cerebrospinal fluid is indicated by the appearance of a granular or flocular precipitate, which gradually settles to the bottom of the tube, beneath a clear, supernatant fluid. The velocity and intensity of the reaction vary according to the quantity of the protein contained in a given specimen. The greater the amount of the protein, the more quickly and distinctly the reaction appears. The granular precipitate appears within a few minutes in a specimen containing a considerable increase in protein, while one hour may be required to obtain a distinct reaction in specimens weaker in protein. In obtaining the reaction, the time period should not be greater than two hours. (Noguchi, H., Serum Diagnosis of Syphilis and Luetin Reaction, Philadelphia and London, 3d edition, 1912, 223.)

degenerating meningococci may be in itself a benefit; however this may be, it is quite certain that a lumbar puncture performed during the recovery to relieve pressure often seems to speed up the convalescence.

The directions for administering the serum may be stated as follows:

The lumbar puncture is performed under aseptic precautions in the third or fourth lumbar space. The patient lies on the side with the back arched, thus giving the greatest possible distance between the spines of the vertebrae. The notch nearest a line connecting the crests of the ilia is found, in the midline of which the needle is introduced and pushed forward and a little upward. The distance to which the needle sinks depends on the muscular development and age of the patient: it varies from ½ to 3 inches. The cerebrospinal fluid is allowed to flow out until the pressure is so reduced that only three or four drops come per minute. The serum is warmed to body temperature and introduced *very slowly* under the least possible pressure and *preferably* by the gravity method. The barrel of a syringe or a funnel may be used. The rubber tubing should be long enough to be raised from 12 to 15 inches, and its diameter should be from ⅛ to ¼ inch. The quantity of serum injected should be less by from 5 to 10 c.c. than the volume of fluid withdrawn. In cases in which no fluid can be removed (so-called dry tap) and the serum still appears to flow into the membranes, great care must be exercised and the patient closely watched for the slightest change in pulse and respiration, which indicates that the introduction must be stopped. If, during the administration of the serum or immediately afterward, the respiration should entirely cease or the pulse become rapid and thready, it is advisable to withdraw some of the serum while the needle is still in position, or even to reintroduce the needle for the purpose immediately. These alarming symptoms are not necessarily serious; but if the withdrawal of serum does not ameliorate the condition, artificial respiration should be at once instituted and protracted if necessary and epinephrin or other heart stimulant injected hypodermically. Sometimes the exudate in the meninges is very thick and refuses at first to pass out through the needle. Gentle suction with a syringe may be tried, or warmed sterile salt solution, or even the serum may be allowed to run in and then out in order to start the flow.

The injection of the serum may also be controlled advantageously by employing a blood-pressure apparatus as advised by Sophian.[21] The withdrawal of cerebrospinal fluid exerts an inconstant effect on the blood pressure. Usually there is a fall; when the fall equals 10 mm. of mercury, the removal is interrupted. The pressure is then used as the guide to the quantity of serum injected. As a rule, rapid injection with force causes a still greater drop. Using the gravity method, it is advisable to allow ten minutes for the dose to run into the meninges; sometimes twenty minutes may be safer, especially in cases with low pressure at the beginning or in which the pressure dropped quickly. A fall of the pressure of 20 mm. of mercury in an adult with average pressure of from 110 to 120 mm. of mercury is regarded as a proper indication to discontinue the injection. Occasionally there is an initial rise in the pressure after a few cubic centimeters of serum have flowed in followed by a subsequent drop as larger quantities are injected. Rarely the pressure rises materially after the injection is completed. Through the use of this guide the quantity of serum given at a dose tends to be smaller than when the pressure is not taken. In employing this control, the aid of an assistant is required to take the blood pressure.

*Mode of Action of the Serum.*—The serum acts locally on the meningococcus and on the exudate, and in this way arrests the infection and promotes subsidence of the inflammation and restoration of the damaged membranes. To bring about these effects, it must be brought into direct relation and kept in continuous contact with the seat of infection. Since the serum reaches the normal meninges not at all and the inflamed meninges very little from the blood, it is useless to inject it subcutaneously or even intravenously in expectation that it will find its way into the subarachnoid space. Moreover, to be effective, it is necessary that the serum should be maintained continuously and in high concentration in the meninges, and as the cerebrospinal fluid is constantly leaving the subarachnoid space by way of the venous blood, the injections must be repeated at suitable intervals.

The first effect of the serum is undoubtedly to injure the meningococcus, which quickly becomes reduced in numbers, is altered in size and staining property, is more numerously taken up by leukocytes (phagocytes), and especially loses its power to grow in cultures. These changes may result from the first or a subsequent injection. The morphologic alterations produced by the serum consist of swelling, fragmentation and weaker staining power of the meningococcus.

The restraint put on the multiplication of and the degeneration produced in the meningococcus by the serum is promptly followed by a clearing up of the turbid or even purulent cerebrospinal fluid. As the inflammatory exudate loses pus cells and returns to a limpid condition, the leukocytes in the general blood, increased during the accession of the inflammation, undergo reduction in number.

In accounting for the beneficial action of the serum, its several properties and associated effects must be taken into account. That it acts directly on the meningococcus and depresses its viability is readily shown both by film and culture tests. The meningococcus is not only altered in form and made more readily phagocytable after one or several of the serum injections, but the disintegration products are also neutralized by the antiendotoxin contained in the serum. Hence the serum possesses bacteriolytic, bacteriotropic (opsonic) and antiendotoxic properties. Levy has prepared an interesting statement of the periods of disappearance of the meningococcus from the cerebrospinal fluid: Thus in eighteen cases it was no longer found after the first injection, in thirty-three cases after the second, in thirty-five cases after the third, in fourteen after the fourth, in nine after the fifth, in four after the sixth, and in one after the eleventh.

The injection of horse serum into the meninges is always followed by transient leukocytosis of the cerebrospinal fluid. Hence when antimeningococcic serum is administered in cases in which the fluid is almost clear, it will be found more turbid on the next puncture twenty-four hours later. This leukocytosis due to the aseptic inflammation induced by the horse serum is harmless; it quickly subsides. Notwithstanding its

21. Sophian: Epidemic Cerebrospinal Meningitis, St. Louis, 1913, p. 54.

power to induce leukocytosis, the arrest of the infectious process in cases in which the fluid is turbid or purulent nevertheless enables the serum to bring about rapid clearing up of the fluid.

*Influence on Duration of Disease and Mode of Termination.*—Cases of meningitis are very varied in respect both to their intensity and to their evolution. Rarely the disease sets in severely and yet terminates in recovery, sometimes in a few days; or the onset is mild, although later the infection develops an alarming gravity; while yet again the disease progresses slowly or continuously through weary weeks or even months to end usually, but not always, in death. The cases of ordinary severity pursue a middle course, while the fulminant ones arise and terminate within from a few to forty-eight hours. The last variety to be mentioned is the ambulant, sometimes called abortive cases:[22] the subjects are commonly slightly ill so that recovery is the rule. Nevertheless in rare instances death may suddenly supervene; while somewhat more frequently the slight illness intensifies progressively until the ordinary form is evolved.

Accurate knowledge is lacking of the relative frequency with which the several types of meningitis occur in different epidemics. Information of the frequency of the extreme cases—the fulminant and the abortive or ambulant so-called—is particularly desirable. Probably the last two should not be thrown together, as the former tends to set in sharply and terminate in recovery by crisis, while the latter begins insidiously and later attracts attention by suddenly passing into the severe disease. Exceptionally an outbreak has been composed wholly of mild or abortive cases proved by bacteriologic examination of the cerebrospinal fluid to be epidemic meningitis. The proportion of fulminant cases appears to be larger at the beginning than at the end of an epidemic. Certain epidemics have been notable by reason of their absence. Again, they have appeared in associated groups, one case following another in rapid succession in barrack, school or family.

Neither the symptoms nor the mode of evolution support a definite prediction as to the probable course of the disease. A sharp discrimination between the several clinical types of the disease set up is often wanting in practice. Hence the outcome of single cases is an uncertain guide to the value of a therapeutic measure.

Death may be considered as taking place under three sets of circumstances: (*a*) rapidly, after sudden onset, as in fulminating meningitis; (*b*) through a gradual intensification of the symptoms and after a duration of six to ten days, or (*c*) slowly and after the disease has become chronic.

Recovery also, when it occurs, is not by a single mode but at least two modes of termination. The transition to convalescence and recovery is generally by a process of gradual amelioration of the symptoms, or lysis. Exceptionally, the transition takes place abruptly by a sudden cessation of the symptoms, or crisis.

The duration of the disease may be considered according to the period elapsing before either death or recovery takes place. Flatten analyzed 1,481 cases according to the time of death: Twenty-five per cent. terminated within the first three days, 24 per cent. from the fourth to the seventh day, and about 50 per cent. later than the seventh day of illness. Survival for the first weeks afforded no great insurance of recovery. One half of the cases surviving the first week terminated between the fifth and eighth week.

Viewed from the side of recovery, the duration fluctuated with the type of case. Strümpell states that the critical period falls betwen the fifth and tenth day when either death results or convalescence begins; but the previous figures given do not bear out this formula. Heubner states that the average duration of the disease terminating by lysis is from four to six weeks; Ziemssen gives from two to four weeks, and Holt's figures for the New York epidemic of 1904-1905 show that among 350 cases in which the patient recovered, the duration in 3 per cent. was one week or less and in 50 per cent. five weeks or longer.

All the foregoing relates to nonserum treated cases. The question now arises as to the influence of the serum treatment on the duration and manner of recovery. Undoubtedly the usual mode of spontaneous recovery is by lysis, and the exceptional mode is by crisis. The histories of 830 serum cases treated and recorded have been analyzed by Flexner from the point of view of the length of persistence of active symptoms and the manner of recovery. As regards the first, the average period of active symptoms was eleven days. This period does not embrace the entire time during which the patients were under observation, as recovery of lost strength and ability to resume ordinary vocations took a greater number of days. But what is especially striking is the fact that in 30 per cent. of the 830 cases, the cessation of the active symptoms was abrupt or by crisis. But manner of recovery is influenced by the period of the disease at which the serum injection is begun, for while termination by crisis and by lysis occurs about equally when the injection of the serum is begun in the first three days of illness, the number of cases ending by lysis rises steadily when the injections are begun later than the third day. Levy, who has especially considered the duration of the active symptoms under the serum treatment, states that in 127 cases it averaged 12.5 days, but calculated from the time elapsing after the first serum injection was given, it was only 6.86 days. By termination of the disease is meant the disappearance of fever and usual symptoms and return of cerebrospinal fluid to normal. One effect often persists for some time after all other active symptoms have abated, namely, stiffness of the neck with or without retraction. Finally, and in due time this yields.

### COMPLICATIONS: SEQUELS, RELAPSE, ACCIDENTS AND MIXED INFECTIONS

The attendant conditions arising in the course of epidemic meningitis are various: The common complications are due to intercurrent infections of the respiratory tract, otitis media and certain rarer affections. The sequels which are of specific nature affect various organs of importance. Taken together they have included from 20 to 25 per cent. of all cases accurately observed during the preserum period. Since the employment of the serum has become more general, the occurrence of complications and sequels, aside from serum disease, has diminished. Thus the French and German figures of the recent epidemic

22. Hochhaus, H. (Deutsche med. Wchnschr., 1915, **41**, 1185), has observed a group of abortive cases in some of which the cerebrospinal fluid was clear, contained an excess of albumin, and in two instances revealed meningococci.

give from 20 to 25 per cent. as the preserum figures. Netter and Dopter have given for the serum period 6.3 and 6.2 per cent., respectively.

*Sequels.*—The three severer specific sequels relate to the meningococcus infection of the internal ear, the eye and the joints; while other serious sequels consist of hydrocephalus, residual paralysis or impaired mentality. The most frequent severe sequel is that resulting from the involvement of the structures of the internal ear. The figures of the preserum period covering this affection as given vary from 12 to 33 per cent. Among the 1,294 serum-treated cases analyzed by Flexner, permanent affections of the internal ear occurred in forty-five instances, or 3.5 per cent. Deafness was complete in thirty-nine and partial in six instances. The eyes are less frequently attacked. The milder affection consists of meningococcic conjunctivitis, probably due to extension of the infection from the nose by way of the tear duct. The severer affection is an iridochoroiditis or metastatic ophthalmia,[23] arising usually in one eye only, and frequently leading to destruction of the bulb. The frequency for the preserum period given varies from 4 to 10 per cent. of all cases; in Flexner's series the percentage was 1. Arthritis is also a variable sequel. Severe inflammation and suppuration arise in part only of the affected joints. When suppuration occurs, the injection of the antimeningococcic serum into the joint has been followed by prompt amelioration of the symptoms.[24]

The frequency with which the sequels arise would seem to have been definitely influenced by the serum treatment except in the case of deafness due to involvement of the essential structures of hearing. The attack on the auditory nerve and internal ear follows sometimes so soon after the appearance of the first signs of meningitis that the hearing is either already impaired or lost on the second day of illness. But as, in not a few cases, the inner auditory apparatus is involved later in the course of the disease, it is quite probable that the prompt arrest of the infection, which often results from the serum, may serve to reduce materially the frequency with which this lamentable by-effect is produced.

Paralysis and impaired mentality are infrequent sequels, but hydrocephalus is a frequent resultant of epidemic meningitis. The internal form of hydrocephalus arises from interference with the escape of the cerebrospinal fluid, usually or invariably infected with the meningococcus, from the cerebral ventricles. The imprisonment of the fluid is brought about sometimes from closure of the exits at the base of the brain by an inflammatory exudate plastered over the foramina of Magendie and Luschka. In other instances, however, there is no organic obstruction but merely a functional lack of mechanical resistance which permits distention of the ventricles under moderate pressure, eventuating possibly in temporary obliteration of the outlets of the fourth ventricle by the weight of the dilated lower horns which press the cerebellum down against the medulla.

The importance of the recognition of the essential pathology of internal hydrocephalus in epidemic meningitis arises from the fact that when separation has been effected between the spinal subarachnoid space and the cerebral ventricles, so that the antimeningococcic serum cannot be introduced into them through lumbar puncture, it may nevertheless be safely and even efficiently introduced directly by ventricular puncture. Already several cases have been reported in which the infected and purulent ventricular fluid has been removed and replaced by the serum to be followed by complete recovery.[25]

The technic of intraventricular injection of the serum is not attended with particular difficulty in young children with open fontanel. The scalp over the anterior fontanel is shaved and rendered surgically aseptic. The needle, which is about 8 cm. long, is inserted near the lateral angle of the fontanel, about 2.5 cm. from the median line, and is gently pushed downward and slightly inward toward the median line to a depth of about 3 cm., when the cerebrospinal fluid will usually begin to flow. When this has ceased, a quantity of serum, usually considerably less than the amount of fluid withdrawn, is allowed to run in by gravity. In older children and in adults a trephine opening is made at a point 3 cm. above and behind the external auditory meatus before tapping the ventricles.

*Serum Disease.*—The use of the antimeningococcic serum, like all other therapeutic serums, is attended with so-called serum disease. It is even possible that this annoying, but usually harmless attendant on serum therapy is more frequent after subarachnoid than after subcutaneous administration. From one third to one half of the treated patients develop some degree of serum disease. The condition comes on about the eighth or tenth day with fever, the usual skin eruption, pain in the joints, digestive disturbance, etc. The important thing is not to mistake these symptoms for a relapse of the infection. Usually any doubt may be immediately removed through lumbar puncture and examination of the cerebrospinal fluid, which will show few cells and no meningococcus. The reinjection of the serum, under the impression that a relapse is threatening, is to be avoided for the reason that a temporary accession of the symptoms, including retraction of the head, may be induced through the fleeting aseptic chemical meningitis induced. Moreover, because of the interval between the last injection and the reinjection, conditions may be favorable to the induction of the anaphylactic reaction, which should, of course, be avoided.

*Relapse.*—A certain number of the patients responding to the serum treatment suffer recrudescences or relapses of the severe symptoms. This condition is attended by a reinvasion of the cerebrospinal fluid, previously clear or clearing, by the meningococcus. It is sometimes difficult to state or determine just what constitutes a relapse, and the danger of confusing the condition with serum disease has just been mentioned. The most trustworthy guide, next to long and complete intermission of the symptoms, is afforded by bacteriologic and cytologic examination

23. Netter (Compt. rend. Soc. de Biol., 1915, **68**, 90) recorded two instances of suppurative iridochoroiditis due to meningococcus in which the intravitreous injection of the serum is stated to have led promptly to the abatement of the inflammation. Sight was retained.

24. Longo. A. (Pediatria, 1917, **25**, 312; Abstr., THE JOURNAL A. M. A., 1917, **69**, 322), has just reported on 31 cases, of which 19 were were given adequate serum treatment and all recovered without appreciable sequels, while the remaining 12 either received no serum or were given in all one or two injections. Of the latter, 7 died and the other 5 were left with deafness, hydrocephalus, mental impairment, or convulsions.

25. Cushing and Shaden: Jour. Exper. Med., 1908, **10**, 548. Fischer L.: New York Med. Jour., 1910, **91**, 625. Netter and Debré: La méningite cérébro-spinale, Paris, 1911, p. 272. Bouché: Jour. de méd. de Bruxelles, 1912, **17**, 61. Neveu-Lemaire. Debeyre, and Rouvière, Compt. rend. Acad. sc., 1916, **162**, 88. de Verbizier, A., and Chauvel, F. (Bull. et mém. Soc. méd., 1916, **32**, 1138), report an adult case with recovery and refer to another successful case in an infant by Triboulet, Rolland and Fenestre. Korteweg: Nederl. Tijdschr. v. Geneesk., 1917, **1**, 1340; Abstr., THE JOURNAL A. M. A., 1917, **69**, 160.

of the cerebrospinal fluid. Returning turbidity of the fluid with increasing cell count, and especially the reappearance of the meningococcus, are decisive. Prompt resumption of the serum injections often, but not invariably, suffices to suppress the reinfections of the meninges arising doubtless from some protected, because little accessible, active focus in the meninges or ventricles.

*Accidents.*—Certain accidents, though rare, are known to attend the subarachnoid injection of the antimeningococcic serum. They are sometimes alarming, but of very brief duration and sometimes so serious as to threaten life. They arise chiefly from two causes: (1) increased intracranial pressure, and (2) anaphylaxis. The notion, advanced a few years ago, that the phenolic preservative employed to maintain sterility in the serum is the dangerous agent, has not been supported by painstaking experimental study, and close observation of treated cases of epidemic meningitis.[26] Attention has already been drawn to the importance of care in the introduction of the serum, which is best accomplished by the gravity method; in that way excessive intracranial pressure is guarded against. Should arrest of the respiration, weak heart action and collapse occur, withdrawal of the serum, prolonged artificial respiration and cardiac stimulants by hypodermic injection are indicated. Everything should be in readiness at the time the serum is administered to carry out these restorative measures. Anaphylaxis, a far less frequent but apparently possible source of accident, is to be guarded against as in the analogous instance of other therapeutic serum injection by means of a desensitizing dose of the serum introduced subcutaneously.

In this connection, it is well not to lose sight of the essential fact that in epidemic meningitis the struggle is with a highly fatal disease, and the one means now possessed to combat it is the antimeningococcic serum. From this it follows that it is not justifiable to withhold the remedy because of a remote danger of accident when a far greater danger threatens by reason of the fatality of the disease itself.

*Mixed Infections.*—In certain instances mixed infections of the meningococcus and other pathogenic bacteria arise. They are rare. The severer and more frequent concomitant infecting micro-organisms are the staphylococcus, streptococcus and pneumococcus. The first two have been known to be introduced into the meninges by the lumbar puncture needle, especially in cases in which many punctures have been made. It is sufficient to point out this danger, in order to indicate the way to avoid it. Concomitant infections with the tubercle bacillus have been reported by several bacteriologists. The cases of mixed infection are uninfluenced essentially by the antimeningococcic serum and, invariably or practically so, end fatally.

### CONCLUSIONS

The foregoing presentation of the case for the prevention and specific treatment of epidemic meningitis is founded on what appears to be a considerable array of facts and trustworthy testimony of the feasibility of the one, and the marked success of the other. There is, therefore, very little to add in the form of concluding remarks. That every practical effort will be made by the military and civil authorities to control epidemic meningitis among our troops and our civilian population, we must believe. It may, therefore, suffice to quote here the conclusion arrived at by the author after critical study of 1,300 cases of the disease treated with the serum supplied by the Rockefeller Institute:

> It is our belief that the analyses of histories of cases of epidemic meningitis which have been presented, furnish convincing proof that the antimeningococcic serum, when used by the subdural method of injection, in suitable doses and at proper intervals, is capable of reducing the period of illness; of preventing, in large measure, the chronic lesions and types of the infection; of bringing about complete restoration to health, in all but a very small number of the recovered, thus lessening the serious, deforming and permanent consequences of meningitis, and of greatly diminishing the fatalities due to the disease.

But, finally, it may be observed that these results, devoutly to be desired and capable of being accomplished, are all contingent on the production and administration of adequate preparations of the antimeningococcic serum. And it may well be feared that unless proper control and standardization of the serum are undertaken, our hopes and just expectations will not be realized.

26. Flexner, Simon: THE JOURNAL A. M. A., 1913, **60**, 1937. Auer, J.: Jour. Exper. Med., 1915, **21**, 43.

## New and Nonofficial Remedies

THE FOLLOWING ADDITIONAL ARTICLES HAVE BEEN ACCEPTED AS CONFORMING TO THE RULES OF THE COUNCIL ON PHARMACY AND CHEMISTRY OF THE AMERICAN MEDICAL ASSOCIATION FOR ADMISSION TO NEW AND NONOFFICIAL REMEDIES. A COPY OF THE RULES ON WHICH THE COUNCIL BASES ITS ACTION WILL BE SENT ON APPLICATION. W. A. PUCKNER, SECRETARY.

**CALCREOSE.**—A mixture containing in loose chemical combination approximately equal weights of creosote and lime.

*Actions and Uses.*—Calcreose, when administered internally, is claimed to have the same actions and uses as creosote. It is claimed that calcreose does not readily produce gastric distress, nausea and vomiting.

There is some evidence to indicate that by the use of calcreose, relatively large quantities of creosote may be administered, but it appears probable that such tolerance is due to the slower absorption and excretion and therefore decreased efficiency. That the creosote contained in calcreose is liberated in the body is evident from the fact that during its elimination by the kidneys it has produced albuminuria and phenol urine.

*Dosage.*—From 0.25 to 1 Gm. (4 to 16 grains) every two to four hours, beginning with small doses and gradually increasing until tolerance is reached. Calcreose may be given in the form of calcreose solution or as tablets (see below).

Manufactured by the Malthie Chemical Co., Newark, N. J. U. S. patent No. 1,047,961 (Dec. 24, 1912; expires 1929). U. S. trademark No. 94789.

*Solution Calcreose.*—Prepared by adding 454 Gm. (1 pound avoirdupois) calcreose to 3785 Cc. (1 gallon) of water, agitating occasionally during twenty-four hours, filtering and adding enough water through the filter to make 3785 Cc. (1 gallon) of solution.

*Dosage.*—Four to 8 Cc. (2 to 4 fluidrachms) in a half-glass of water, followed immediately by one-half glass of water, beginning with 4 Cc. (1 fluidrachm) in one-fourth glass of water.

*Calcreose Tablets, 4 grains.*—Each coated tablet contains calcreose 4 grains.

According to the patent specifications calcreose is made by the interaction of equal parts of creosote and lime in the presence of water. A minute quantity of phenolphthalein is added to the finished product to improve the color of calcreose solution.

Calcreose is a dark brown powder, having an empyreumatic odor and a sharp phenolic taste. It is partially soluble in water; the alkaline solution containing calcium compounds of the phenolic bodies of creosote while the insoluble portion consists largely of calcium hydroxide and calcium carbonate.

**BETANAPHTHOL BENZOATE** (See N. N. R., 1917, p. 197).

**Betanaphthol Benzoate-Calco.**—A non-proprietary brand complying with the standards for betanaphthol benzoate.

Manufactured by The Calco Chemical Company, Bound Brook, N. J.

## Therapeutics

### FOOD FOR CHILDREN FROM TWO TO SEVEN

It is possible to fulfil the requirements of a proper diet, meet the conditions of present unusual prices, and still have a wide choice of foods for children from 2 to 7 years of age, according to a leaflet of the Department of Health of the City of New York. This leaflet was prepared on account of the dearth of compiled information on the feeding of the important group in the community between the ages named. It represents careful work by Drs. L. Emmett Holt, Graham Lusk, Linnaeus E. LaFétra and Godfrey R. Pisek, assisted in the computation of food prices by Dr. F. C. Gephart, and is said to be designed for the use of visiting nurses, social service workers and others coming in contact with those in need of instruction in food economies. Under present circumstances it may have practical application in a wide field.

The leaflet outlines and gives the cost in calories, per pound, etc., for the ages named, of a diet sufficient (balanced), digestible and economical, containing the essential food substances, fat, carbohydrate (sugar or starch) and protein, besides other elements which must be considered — water, certain salts and "vitamins." These substances must be furnished in proper proportions to maintain health. It has been found that a healthy child from 2 to 4 years old requires daily from 1,200 to 1,400 food units (calories); from 4 to 7 years of age the amount should be from 1,400 to 1,700 calories.

TABLE 1.—COST OF FATS

| | Cost of 1,000 Calories, Cents | Price per Pound, Cents |
|---|---|---|
| Cottonseed oil | 7.3 | 31 |
| Oleomargarin | 8.5 | 30 |
| Peanut butter | 8.8 | 25 |
| Butter | 11.9 | 43 |
| Olive oil | 12.1 | 51 |
| Bacon | 13.8 | 37 |
| Cream (extra heavy, 40 per cent.) | 19.8 | 65 (pint) |
| Bacon, sliced, in jars | 22.2 | 65 |

TABLE 2.—COST OF CEREALS

| | Cost of 1,000 Calories, Cents | Price per Pound, Cents |
|---|---|---|
| Corn meal, in bulk | 3.6 | 6 |
| Hominy, in bulk | 3.6 | 6 |
| Broken rice, in bulk | 3.7 | 6 |
| Oatmeal, in bulk | 3.8 | 7 |
| Samp, in bulk | 4.2 | 7 |
| Quaker Oats, in package | 4.4 | 8 |
| Macaroni, in package | 4.5 | 13 |
| Wheat flour, in bulk | 4.6 | 8 |
| Malt breakfast food, in package | 4.8 | 14 |
| Pettijohn, in package | 5.3 | 12 |
| Cream of wheat, in package | 5.7 | 10 |
| Farina, in package | 5.9 | 12 |
| Cracked wheat, in bulk | 5.9 | 10 |
| Pearl barley, in package | 6.0 | 10 |
| Barley flour, in bulk | 6.1 | 10 |
| Whole rice, in bulk | 6.1 | 10 |
| Wheatena, in package | 8.1 | 14 |

*Fats.*—Regarding fats, it is said that both animal and vegetable fats are useful as foods, the animal fats being superior, however, and of these the most economical is said to be oleomargarin. The cost of the fats is given in Table 1.

*Carbohydrates.*—The carbohydrates include cereals, vegetables, breadstuffs, sugar and sweets. These are cheaper in bulk, and more expensive when purchased in special packages. When arranged according to their food value and price per found, the cereals appear as in Table 2.

It will be seen that, when purchased in bulk, oatmeal, corn meal, hominy, samp and rice are most economical. Their cost in that form is contrasted in Table 3 with the so-called ready-to-serve cereals with proprietary names. These proprietary foods are of higher cost and more difficult of digestion by young children, which more than offsets the ease of preparation.

TABLE 3.—COST OF READY-TO-SERVE CEREALS

| | Cost of 1,000 Calories, Cents | Price per Pound, Cents |
|---|---|---|
| Shredded Wheat Biscuit | 7.8 | 13 |
| Grape-Nuts | 8.6 | 15 |
| Force | 9.4 | 16 |
| Corn Flakes | 11.7 | 20 |
| Puffed Rice | 23.5 | 52 |

*Vegetables.*—The cost and relative caloric values of the various vegetables are set forth in Table 4. The value of vegetables, it is said, depends not only on the amount of fat, carbohydrates and protein which they contain, but also on their richness in iron and other important salts, and on the amount of fiber, which aids proper action of the bowels. For these reasons they are indispensable to a proper diet notwithstanding their relatively high cost. Spinach, beet tops, chard and other "pot greens" are said to be of particular value. It is said, however, that for children of the ages under consideration, no raw vegetables, such as radishes, tomatoes, cucumbers, onions or celery, no green corn, peppers, egg plant or cabbage should be allowed.

TABLE 4.—COST OF VEGETABLES

| | Cost of 1,000 Calories, Cents | Price per Pound, Cents |
|---|---|---|
| Turnips | 20.0 | 2.5 |
| Sweet potatoes | 21.8 | 10.0 |
| White potatoes | 25.8 | 4.0 |
| New beets | 27.6 | 5.0 |
| Onions | 29.3 | 6.0 |
| Spinach | 30.0 | 3.3 |
| Green peas | 39.2 | 10.0 |
| Lima beans | 39.2 | 10.0 |
| Cauliflower | 42.9 | 6.0 |
| Carrots | 50.0 | 8.0 |
| String beans | 55.6 | 10.0 |
| Squash | 76.2 | 8.0 |
| Lettuce | 89.4 | 7.0 |
| Celery | 214.0 | 15.0 |

*Breadstuffs.*—Hot bread or rolls, griddle cakes and doughnuts should not be given to young children, but corn bread should be used for at least one meal a day. Bread and rolls should be stale or dried on the stove or in the oven till crisp. The costs of the various breadstuffs are given in Table 5.

TABLE 5.—COST OF BREADSTUFFS

| | Cost of 1,000 Calories, Cents | Price per Pound, Cents |
|---|---|---|
| Ginger snaps | 6.3 | 12.0 |
| Graham bread | 8.2 | 10.3 |
| White bread | 8.5 | 10.3 |
| Rye bread | 8.7 | 10.3 |
| Graham crackers | 9.2 | 18.0 |
| Soda crackers | 9.4 | 18.0 |
| French rolls | 10.8 | 14.0 |
| Uneeda Biscuit | 12.4 | 24.0 |

*Sugars and Sweets.*—No candy or chocolate should be given before a child is 5 years old, it is said, and then not more than one piece a day. Not more than one teaspoonful of sugar should be given on a dish of cereal.

*Protein Foods.*—One of the greatest difficulties, it is said, in furnishing a proper diet at moderate cost is to supply the proteins in the amount needed. These foods as a class cost much more than either fats or carbohydrates. The cheapest and best protein for children, even at present prices, is said to be milk. Costs and values of proteins are given in Table 6.

TABLE 6.—COST OF PROTEINS

| | Cost of 1,000 Calories, Cents | Price per Pound, Cents |
|---|---|---|
| Milk (Grade A) | 18.5 | 13 (quart) |
| Roast beef (rib) | 23.4 | 26 |
| Buttermilk | 26.5 | 9 (quart) |
| Lamb chops (loin) | 32.7 | 43 |
| Lamb chops (rib) | 34.9 | 38 |
| Young codfish (fresh) | 38.6 | 12 |
| Chicken (roasting) | 41.3 | 32 |
| Eggs | 44.7 | 45 (dozen) |
| Beef steak (round) | 45.6 | 34 |
| Haddock | 46.0 | 12 |
| Flounder | 50.0 | 12 |

Fish at certain seasons are cheap and useful. Vegetables high in protein may largely replace meat in the diet, such as beans and peas, fresh or dried, which may be given as soups. Together with milk and bread, they may entirely replace meat. Wheat and oats contain most protein. Among the protein foods interdicted for children are sausage, pork, ham, liver and smoked, salt or dried fish.

*Fruits.*—Fresh fruits, though expensive except for the short time when they are in season, should be given freely. It is said, however, that berries, cherries, pineapple and plums should not be given, since they are not easily digested, and are usually expensive. A warning is given against stale or unripe fruit, or fruit out of season. Bananas should be thoroughly ripe, or else baked or boiled. The more extensive use of stewed dried fruits is urged. Fruit should be given with other foods and not between meals. The costs of fruits are set forth in Table 7.

TABLE 7.—COST OF FRUIT

| | | Cost of 1,000 Calories, Cents | Price per Pound, Cents |
|---|---|---|---|
| Fresh (in season) | | | |
| | Grapes | 14.9 | 5 |
| | Rhubarb | 15.4 | 1 |
| | Bananas | 20.0 | 6 |
| | Apples | 23.7 | 5 |
| | Pears | 46.0 | 12 |
| | Oranges | 58.8 | 10 |
| | Peaches | 96.7 | 15 |
| Dried | | | |
| | Prunes | 8.4 | 10 |
| | Apples | 11.1 | 15 |
| | Peaches | 12.5 | 15 |
| | Apricots | 15.5 | 20 |

*Desserts.*—Desserts permitted to young children are plain puddings made from rice, farina, cornstarch or stale bread; custard; junket, ice cream not oftener than twice a week and in small portions, bread with (corn) syrup or jelly; plain cookies, gingersnaps, sponge cake or lady fingers once daily with meals. Pastries, pies and rich cakes, particularly those made with nuts and dried fruit, are forbidden.

*Drinks.*—Milk, not less than a pint nor more than a quart daily, at present prices, is cheaper and better than any other food of equal caloric value. It is indispensable for younger children. Cocoa, made with milk, may be substituted for milk in cold weather. Children should drink from two to four glasses of water daily. Tea, coffee, wine, cider and soda water are interdicted.

*Habits to Be Avoided.*—Food at other than regular meal times; entire meals consisting of only one article of food; imperfect chewing of food; rapid eating with much drinking during meals; feeding between regular meals; coaxing or forcing the child to eat without appetite.

*Cooking.*—Cereals should be cooked for not less than one hour, and most of them for three hours. A double boiler or a fireless cooker may be used. Green vegetables should be cooked with very little water; all vegetables should be thoroughly cooked. Potatoes should be boiled with the skins on and peeled afterward, thus saving at least one sixth of the potato. Meats should be roasted, broiled or boiled; neither meat, chicken nor fish should be fried. Roasted or broiled meats should be eaten rare. Eggs should not be fried. Meat stews with potatoes and other vegetables are to be recommended, provided they are thoroughly cooked and the fat has been removed. Clear soups have almost no food value, but when vegetables, barley, noodles or rice are added are useful foods. Thick soups, especially those made with peas and beans, with the addition of milk, are nutritious and cheap, and, it is said, can largely replace meat and eggs in the diet.

*Sample Diets.*—Following are sample diets furnishing sufficient quantities of food for healthy growth, but omitting meat on account of its high cost:

SAMPLE DIET—TWO TO FOUR YEARS

*Breakfast, 7 a. m.:* Cereal (oatmeal, hominy, rice or corn meal), 2 to 3 good tablespoonfuls with 1 even teaspoonful sugar and 2 ounces milk. Crisp toast or bread (stale), one or two slices with butter. Milk, 8 ounces, from cup.

*Morning lunch, 10:30 a. m.* Milk, 6 ounces. Bread (stale), one slice.

*Dinner, 1:30 p. m.:* One egg, or cup thick soup. Rice or macaroni, 2 tablespoonfuls, or one small baked potato. Fresh vegetable, 2 tablespoonfuls. Stewed fruit, 3 or 4 tablespoonfuls. Bread, one or two slices, with butter. Water.

*Supper, 6 p. m.:* Cereal, 2 or 3 good tablespoonfuls with sugar and 2 ounces milk. Milk, 6 ounces, from cup. Bread and butter, one slice. Custard, junket or plain pudding, 2 to 4 tablespoonfuls.

SAMPLE DIET—FIVE TO SEVEN YEARS

*Breakfast, 7:30 a. m.:* Cereal (as given for two to four years), 4 tablespoonfuls with 1 teaspoonful sugar and 2 ounces milk. Bread (stale), (white, graham or corn bread), or toast, with butter, two slices. Fruit, one fully ripe banana, peach, pear, or grapes, in season. Cocoa made with milk, one cup; or milk, 8 ounces.

*Dinner, 12:30 p. m.:* Meat stew with vegetables; or soup made with milk and peas or beans; or fish; or egg. Potato, rice, samp or macaroni with oil or butter. Fresh vegetable (spinach, chard, squash, carrots, turnips, string beans, boiled onions or celery), 3 tablespoonfuls. Bread and butter, one or two slices. Stewed dried fruit (apples, peaches, prunes, apricots), 3 or 4 tablespoonfuls. Ginger snaps or plain cake or jelly sandwich. Water.

*Supper, 6 p. m.:* Cereal as at breakfast, with soup, or one egg. Bread (stale), two slices, with butter or peanut butter. Cup of cocoa made with milk. Plain pudding made with milk; or stale bread with corn syrup.

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**Old Age Dependency.**—It is estimated that one and one-quarter million persons in the United States who have reached the age of 65 are in want and are supported by charity, public and private. This means that 28 per cent., or, in other words, more than one out of every four are dependent on public or private charity. In Massachusetts, where an excellent census was recently completed (1915), it was found that close to 35,000 persons out of a total of 190,000 were the recipients of public or private relief. This constitutes 18.2 per cent. of the total population 65 years and over, but does not include a very large number who received assistance or maintenance from relatives and other unregistered sources.—Louis I Dublin, *The Vital Statistics of Old Age.*

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SATURDAY, SEPTEMBER 8, 1917

## NERVE REGENERATION AND THE NEUROTIZATION OF PARALYZED MUSCLES

Despite the high degree of perfection which surgical technic and aseptic procedure have attained, the transplantation of certain organs into the body has encountered unexpected if not insurmountable difficulties. In the case of thyroid tissues, for example, it appears that success may be obtained only when there is an actual dearth of similar functioning tissue in the organism which receives the transplant. Likewise the transplantation of parathyroids, even in the same species, seems to succeed far more readily in the case of individuals previously deprived of these glandular structures. In those endowed with a suitable parathyroid outfit, additional transferred glands apparently undergo atrophy. In other words, the retention or survival of functional capacity in such structures depends on a physiologic need of their activity in the organism involved.

A somewhat comparable experience has just been reported by Elsberg[1] in attempts to secure functionally successful nerve implantations in muscles. He found that it is quite possible to reestablish effective neuromotor connections in paralyzed muscles by the implantation either of nerve from the same muscles or of foreign nerve. Stimulation of either implanted or reimplanted nerves may be followed by good contraction of the muscle, and such neurotization of a muscle is still possible even when it has been deprived of its nerve supply for many weeks. But Elsberg has also found that hyperneurotization of a normal muscle is impossible; a normal muscle cannot be made to take on additional nerve supply. The implanted nerve cannot make any neuromotor connections, and its stimulation will usually fail to have any effect on the muscle. If, however, the muscle is permanently separated from its original nerves, then the implanted nerve — which until now has been unable to form a connection with the muscle fibers — will establish neuromuscular connections, and electric stimulation of the nerve will soon cause normal contractions of the muscle.

1. Elsberg, C. A.: Experiments on Motor Nerve Regeneration and the Direct Neurotization of Paralyzed Muscles by Their Own and by Foreign Nerves, Science, 1917, **45**, 318.

These studies prove that if a muscle once has its normal nerve supply, no other motor nerve is able to make neuromuscular connection with the same muscle. But, further than this, Elsberg has ascertained that if the normal nerve is cut and reimplanted into a muscle and at the same time a foreign motor nerve is also implanted into the same muscle, only the former will make neuromuscular connections. Why or how the normal nerve of a muscle gains ascendency over the foreign nerve affords an interesting though unanswered speculation. Elsberg remarks that it is impossible at present to state whether the discrimination is due to a more rapid regeneration of the normal nerve or to the fact that the regenerating normal nerve has an inhibitory influence on the intramuscular regeneration of the foreign implanted nerve. The axis cylinders of the normal nerve to the muscle seem to be able to reestablish their former connections with the end plates or bulbs or to form new end organs more quickly or more powerfully than do those of a nerve which has belonged to a different muscle.

## BENCE-JONES PROTEINURIA

In 1847, Bence-Jones presented before the Royal Society of London a paper, "On a New Substance Occurring in the Urine of a Patient with 'Mollities Ossium,'" in which he described for the first time the substance since known as the Bence-Jones protein. It was rediscovered and described by Kühne[1] in 1869. In view of certain chemical reactions, particularly peculiar changes of solubility in the urine under the influence of heat, the Bence-Jones protein has often been classed with the proteoses, such as those formed in the partial digestion of native proteins.

More recent investigations, in which the newer chemistry and knowledge of the biologic relations of the proteins have been taken into account, make it seem less likely, if indeed at all probable, that the Bence-Jones protein which occurs in the urine of patients with multiple myeloma of the bones is of a proteose nature. Taylor and Miller[2] of the University of Pennsylvania have ascertained, for example, that the Bence-Jones protein separated from the urine exhibits powers of sensitization and anaphylactic response in suitable test animals. Accordingly, they have concluded that the anaphylactic activity of this protein confirms the belief that it is a higher protein of individual biologic stamp and not a degradation stage in the hydrolysis of any body protein. The proteoses produced by hydrolysis are not anaphylactically active.

The separated Bence-Jones protein is easily digested under appropriate conditions by both the gastric and

1. For a historical account, see the dissertation of Rosenbloom, J.: A Contribution to the Study of the Nature and Origin of the Bence-Jones Protein, New York, Columbia University, 1909.

2. Taylor, A. E., and Miller, C. W.: Studies in Bence-Jones Proteinuria, Jour. Biol. Chem., 1916, **25**, 281.

the pancreatic proteolytic enzymes. Hopkins and Savory,[3] who made an elaborate study of this protein at the University of Cambridge, England, concluded that it yields all those amino-acids which are to be obtained from typical proteins, and is therefore not a fractional product arising from the partial breakdown of protein in metabolism. Correspondingly, Taylor and his colleagues have decided that the protein is not proteose, but a higher protein of definite biologic stamp — a human product closely resembling the normal blood proteins.

The striking feature of Bence-Jones proteinuria, as it has been expressed by Taylor, Miller and Sweet,[4] is the free passage of large quantities of the protein through a kidney which holds back the normal serum proteins. Experiments on animals show no direct toxicity of the protein. Normal subjects are able to utilize or catabolize a moderate amount of Bence-Jones protein, even when this is injected rapidly into the circulation; but a limit is soon reached beyond which the excess protein is promptly excreted in unchanged condition. It has been pointed out[2] that if the Bence-Jones protein is to be regarded as foreign to the tissues of the subject, we should expect, according to the Abderhalden hypothesis, that a special ferment would soon be aroused to destroy it in the body; and certainly there would seem to be nothing in the nature of the substance itself to resist such a fate. Yet instead of being digested, large quantities of it are excreted in its native condition, apparently free from hydrolysis; and this may continue indefinitely. Under such circumstances we must dismiss the idea of a protective ferment.

With respect to the origin of the unique protein, the Philadelphia investigators have discussed two sources: The protein may be a special product of the tumor cells of the myeloma; or it may be a normal or possibly aberrant stage in the synthesis of some body protein, the completion of which is interfered with by deficiency of some necessary condition. The Bence-Jones protein is of endogenous origin in any event. The supposition that it arises in the bone marrow is a natural one in view of its association with disease of this tissue. Rosenbloom[1] at one time actually ventured the assumption that the protein may be formed from osseo-albuminoid by the action of enzymes present in the bone marrow. But Taylor, Miller and Sweet[4] believe that the surprisingly large amounts secreted — as much as 30 gm. per day in their case — would indicate some more general source. In view of its biologic reactions, they prefer to relate it more closely to the blood proteins, and to ascribe its origin to an interrupted or abnormal synthesis of some normal body protein. The protein evidently circulates with great freedom throughout the body, for it has been found in the pleural fluid and in the blood in determinable amounts. As its origin still remains obscure, renewed efforts should be made to discover new cases of its occurrence and to investigate them intensively.

3. Hopkins, F. G., and Savory, H.: Jour. Physiol., 1911, **42**, 189.
4. Taylor, A. E.; Miller, C. W., and Sweet, J. E.: Studies in Bence-Jones Proteinuria, II, Jour. Biol. Chem., 1917, **29**, 425.

## THE HUMIDITY OF SCHOOLROOMS

We have referred on previous occasions to the lack of evidence concerning the effect on health and comfort of the relative humidity in living rooms. The hasty assumption that a low relative humidity means similar dehydrating power, whether in a desert or in a schoolroom, is obviously unjustified. Consideration of the principles of elementary physics is sufficient to show that other factors, such as air movement and air temperature, are of great importance in determining the loss of heat and of moisture from the human body. The emphasis sometimes laid on "humidifiers" and humidifying processes by newspaper sanitarians may conceivably divert attention from more significant matters. It is plainly impossible to maintain proper atmospheric conditions of any sort without taking into account air temperature and air motion as well as air humidity. The useful if somewhat awkward expression, "air-conditioning," has come to represent for ventilating experts the sum total of the factors involved.

Palmer, of the New York State Commission on Ventilation, recently presented a paper at the Chicago meeting of the American Society of Heating and Ventilating Engineers which brought out this point with great force and clearness. Very interesting dryness records in rooms of public schools were cited, showing plainly that comfort does not depend solely on humidity. In one building, three fan-ventilated, humidified rooms were contrasted with three window-ventilated, unhumidified rooms. The five complaints of excessive dryness that were received from teachers all came from the fan-ventilated, humidified rooms. There are many things to be considered in such studies. The rate of evaporation from the body is perhaps even more affected by air movement than by relative humidity. The sensation of dryness is not always measurable by the loss of water from the body. As Palmer says: "On a cold windy day in winter we feel dry. This sensation must come not from a water loss that is at all comparable [with what occurs in summer] . . . but from the appreciable evaporation of what water is accessible on the skin, and the failure of the cold, contracted, waterless skin surface to keep the supply up to the demand." It is within the experience of every one that the sensation of dryness becomes acute under conditions in which the water loss from the body cannot be made up by drinking.

The question of the evaporation of water from the nose and lungs is of course on a somewhat different footing from that relating to the whole body. Here, however, excessive humidity seems to be more detri-

mental than slight humidity. The nasal mucous membrane of the workers in the warm, moist atmosphere of laundries appears to be in a worse condition than that of the firemen and boiler tenders who are exposed to hot, dry air. According to Palmer, respiratory affections among schoolchildren are associated with high temperature rather than low relative humidity.

It is certainly not fair to state or to imply that schoolrooms admittedly dry and drying are as dangerous to health as deserts. The known physiologic effects of life in deserts are not duplicated in our northern schoolrooms in winter, even if the relative humidity is "lower than in deserts." The loss of moisture from wet objects and from the human body is much less. Even the sensation of uncomfortable dryness is absent in schoolrooms with a low relative humidity, but without excessive continuous air flow and too great warmth (over 68 F.). As Palmer well expresses it: "Relative humidity by itself is thus a criterion of neither dryness nor dryingness, nor the sensation of dryness."

## YEAST

From time to time yeast has attained a transitory popularity as a therapeutic agent. Its use in this way in practical medicine has been based essentially on empiric considerations. Yeast is rich in nucleic acid, but this has not found any special applications. The fat-like substances obtainable from yeast have been recommended in certain alimentary conditions, without finding any widespread acceptance.

More recently yeast has acquired interest from somewhat different angles. In these days of food shortage and enforced conservation, it has come to be realized that the minute yeast cells are endowed with a remarkable capacity of synthesizing one of the most valued nutrients, namely, protein. This substance can be built up out of the simplest forms of nitrogenous compounds by yeasts, in contrast with the incapacity of the higher organisms to construct protein out of anything less complex than the ready made amino-acids. It is reported that in Europe yeast has actually been grown on a large scale in solutions of sugar, salt and simple nitrogenous compounds for the sake of securing the much desired proteins. The utilization of yeast protein for cattle feeding is a current practice abroad; and the satisfactory digestibility and availability of the same product by the human organism has repeatedly been announced since the beginning of the war.[1] In this country the yeast which is produced as a by-product of the brewing industry is for the most part discarded as waste; in the distilleries it becomes a part of the distillers' grains that are extensively employed as feeds in the dairy industry.

Still newer is the indication that yeast is comparatively rich in at least one of the as yet unidentified accessory factors in nutrition now popularly spoken of as vitamins. Hopkins[2] of the University of Cambridge, England, first directed attention to this unique property of yeast. It has been verified by Funk and Macallum,[3] and recently Osborne and Mendel[4] have given substantial evidence of the potency of yeast to render a diet not otherwise capable of inducing maintenance effective in nutrition.

Yeast has been used, like extracts of rice polishings, to cure the experimental polyneuritis induced in birds by a diet of polished rice. From the experiments of Osborne and Mendel it appears that less than 2 per cent. of dried brewers' yeast suffices to induce small experimental animals to grow on artificial food mixtures on which alone they fail to thrive. How the use of yeast as an adjuvant to otherwise inadequate food mixtures exerts its beneficial effect is not yet made clear. Satisfactory growth in these cases is promoted by liberal eating. Anything which renders food more palatable may stimulate one to eat more liberally of it. This can scarcely be the explanation of the potency of the yeast as it is effective even when fed apart from the rest of the food. It may have a favorable effect on the metabolism and thus improve the general condition so that more food is consumed. Small quantities of milk and extracts of many of the common plant foods, such as the cereal grains, have been found to act in the same way. There seems to be little doubt, therefore, that yeast also contains something comparable with the so-called water-soluble vitamins of the diet. A specific need for yeast can scarcely be predicated on this fact, however; for any well selected human dietary containing the usual variety of animal and vegetable foods is not likely to be devoid of the widely distributed water-soluble type of vitamin. We mention this to check premature enthusiasm for a new vitamin.

## VITAMIN DEFICIENCY AND DISEASE

The expression, "deficiency disease," has come to be employed in the highly restricted sense of a disorder of metabolism due to the lack of some specific unidentified dietary substance or "vitamin" in the ration. Like most novel conceptions, it readily found enthusiastic advocates, precisely as the demonstration of the undisputed existence of diseases of bacterial origin made infection a popular explanation of all manner of unsolved maladies. The hypothesis at the basis of the current explanation of deficiency diseases was strikingly verified in the investigations of the pathogenesis of beriberi. It is not surprising, there-

1. Yeast in a New Rôle, editorial, THE JOURNAL A. M. A., April 29, 1916, p. 1390; Yeast Nutriments in Bread Making, Sept. 30, 1916, p. 1023.

2. Hopkins, F. G.: Jour. Physiol., 1912, **44**, 425.

3. Funk, C., and Macallum, A. B.: Jour. Biol. Chem., 1915, **23**, 413; 1916, **27**, 51. Funk, C.: Jour. Biol. Chem., 1916, **27**, 1.

4. Osborne, T. B., and Mendel, L. B.: The Rôle of Vitamines in the Diet, Jour. Biol. Chem., 1917, **31**, 149.

fore, that such pathologic puzzles as scurvy, pellagra, rickets and other as yet unexplained diseases have been put into the same class. And thus a multiplicity of vitamins has been postulated.

The probable failure of the theory of a specific deficiency in the diet to account for the genesis of scurvy has recently been reviewed in THE JOURNAL.[1] The all but complete demonstration that scorbutus is the outcome of a diet inappropriate in its physical rather than its chemical make-up justifies an attitude of skepticism regarding the validity of the "vitamin" theory of the etiology of the other diseases now classed in the same general category. The essentials of an adequate diet can now be formulated with a presumable dependability not approached before the modern studies of nutrition.[2] They are believed, on the basis of experiment rather than mere conjecture, to include protein of suitable quality and in adequate amounts, an abundance of available energy in the form of digestible nutrients, suitable inorganic substances, and an appropriate content of water-soluble and fat-soluble dietary factors not heretofore identified.

Evidently malnutrition of a severe type may attend the consumption of a diet defective in respect to any of these several factors. When none of them is missing, as far as the trained student of nutrition can discover, it is imperative to search for some defect of texture or some other latent alimentary danger before the more convenient hypothesis of a new specific vitamin deficiency is elaborated. In view of the fact that several alleged "deficiency diseases" are actively under investigation at the present time, it seems worth while to record a recent prediction of McCollum and Pitz.[3] Trained in the intensive study of nutrition in health and disease, they venture the belief that inquiry will establish what is now all but demonstrated, namely, that unfavorable proportions among the well recognized constituents of the diet as well as of the two recently appreciated ones, together with unsatisfactory physical factors and injury wrought through the agency of micro-organisms inhabiting the alimentary tract, will account for all the observed types of pathologic functioning which are referable to errors in the diet.

1. The Etiology of Scurvy, editorial, THE JOURNAL A. M. A., Sept. 1, 1917, p. 728.
2. For a comprehensive review of the subject, compare McCollum, E. V.: The Supplementary Dietary Relationships Among Our Natural Foodstuffs, THE JOURNAL A. M. A., May 12, 1917, p. 1379.
3. McCollum, E. V., and Pitz, W.: The "Vitamine" Hypothesis and Deficiency Diseases: A Study of Experimental Scurvy, Jour. Biol. Chem., 1917, **31**, 229.

**Biology and the Citizen.**—The time has come when one cannot be a good citizen without some knowledge of biology. The person who does not believe in vaccination or the so-called "germ theory" of disease or quarantines, who fights against taxes to improve the water supply or to dispose of sewage or to get rid of malarial mosquitoes, who opposes the appointment of health officers, or the scientific inspection of milk and other foods, or the medical examination of schoolchildren, is not only an ignoramus but he is also a bad citizen. —E. G. Conklin, *Yale Review.*

## *Current Comment*

### MEDICAL STUDENTS, INTERNS AND THE DRAFT

Elsewhere in this issue appears the official announcement of the regulations prescribed by the President as a solution of the serious question of drafting medical students and hospital interns. This announcement comes as a logical and welcome conclusion to THE JOURNAL'S campaign on this vital question. The facts obtained from THE JOURNAL'S questionnaire relative to the number of medical students that would be drafted left no doubt that the medical situation of the future would have been threatened as regards both military and civil life. All will rejoice, therefore, that a practical solution of the problem has been discovered. As has been repeatedly stated, the Provost Marshal decided that there is no provision in the selective service law of 1917 — the conscription law — under which medical students can be exempted or discharged. The solution discovered, however, utilizes a section of the National Defense Act, which was passed in 1915, and which became effective in June, 1916. It is under this same law that the Medical Officers' Reserve Corps is organized. This law, it will be remembered, in addition to providing for an Officers' Reserve Corps also provided for an Enlisted Reserve Corps. Medical students and interns who have been drafted therefore will be in the same relative position to the Army as physicians who are members of the Medical Officers' Reserve Corps, not on active duty. At the same time, and in like manner, they will be subject to assignment to active duty when any emergency may require. This means, of course, that if a young man should decide not to continue his medical education he would be subject to order to active duty.

### THE ALVEOLAR AIR IN ASTHMA

In asthma, and in obstructed expiration in general, there is a disturbance in aeration in the lungs. This is shown with scientific accuracy by the increased content of carbon dioxid that has been measured during the asthmatic attack by various investigators. The explanation of the admittedly insufficient aeration of the blood has been a debated point. Not long ago Hoover[1] attributed the disturbance to a respiratory cause. He concluded from his studies that "the real difficulty of ventilation in asthma lies in a distention of the infundibula, and this fails to permit an equal diffusion of carbon dioxid throughout the alveolar air." Friedman and Jackson[2] of the Laboratory of Physiology at the University and Bellevue Hospital Medical College, New York, have, however, pointed out that the extremely ready diffusibility of carbon dioxid gives little plausibility to Hoover's hypothesis. As the result of careful experimental studies, they are inclined to believe that a circulatory factor is the important one.

1. Hoover, C. F., and Taylor, Lester: The Ventilatory Function of the Lung in Emphysema and Asthma, Arch. Int. Med., January, 1915, p. 1. Hoover, C. F., and Gammon, J. E.: The Dead Space in Moderate and Large Respiratory Ventilation, ibid., April, 1915, p. 591.
2. Friedman, E. D., aund Jackson, H. C.: The Carbon Dioxid Content of Blood and of Alveolar Air in Obstructed Expiration, Arch. Int. Med., May, 1917, p. 767.

The cough in asthmatics, along with the voluntary attempts to aid respiration, would accentuate the embarrassment of the lesser circulation in the lungs. The positive intrabronchial pressure during the prolonged expiration inevitably interferes with the free flow of blood through the pulmonary capillaries, as Friedman and Jackson have demonstrated experimentally. There is a damming back of the blood on the venous side, with little opportunity for gaseous exchange. As a consequence, there is an accumulation of carbon dioxid in the blood with the liberation of the gas into the alveolar air, chiefly during the short inspiratory phase of asthmatic breathing. The low pulse pressure, probably due to diminished systolic volume, the enlarged veins in the neck, and the cyanosis suggesting a certain amount of general venous stasis that appears whenever a rise in intrathoracic pressure interferes with a free flow of blood to the heart, are added clinical phenomena observed in asthma, furnishing further grounds to suspect that circulatory disturbances are primarily responsible for the conditions associated with obstructed expiration.

## THYROID, PARATHYROID AND CARBOHYDRATE METABOLISM

Much of the evidence respecting the possible rôle of the endocrine glands in the metabolic functions is so conflicting or uncertain that every series of findings that are reasonably concordant deserves more than passing notice. There are continually recurring suggestions of a relationship between the thyroidal structures, which include both the parathyroids and the thyroids proper, and carbohydrate metabolism. Precisely what the nature of this connection is has not been solved. Underhill[1] and his collaborators have deduced from an experimental standpoint the probability that the parathyroids exercise a more profound function in regulating carbohydrate transformations than do the thyroids. They assert that after thyreoparathyroidectomy the assimilation limit for glucose given by mouth or subcutaneously is significantly lowered in dogs. Thyroidectomy alone fails to produce such an effect. On the other hand, the extirpation of three parathyroids causes a diminished assimilative power for glucose, and the removal of three parathyroids plus one thyroid produces no greater effect than is observed after the excision of the three parathyroids alone. With two intact parathyroids, the power of the body to utilize sugar is not decreased even in the complete absence of the thyroids. In a new group of experiments, Janney and Isaacson[2] of the Montefiore Hospital for Chronic Diseases, New York, have observed that the blood sugar after thyroidectomy showed a marked decrease, averaging about 25 per cent. less than the normal value. Whereas the feeding of glucose in suitable quantity to normal fasting animals provokes a hyperglycemia lasting several hours, in these investigations after thyroidectomy, glucose fed under the identical experimental conditions failed to raise the blood sugar to the level attained before the operation. Although there thus is some conflict of opinion as to what part of the thyroid-parathyroid outfit is really responsible for these effects on the behavior of carbohydrate in the organism, evidence is accumulating, as Janney and Isaacson remark, to show that a persistent low sugar content may be a sign of insufficient internal secretion of some sort. They have observed hypoglycemia in cretinism. It is present in myxedema, in Addison's disease, and after removal of the suprarenal bodies. The experimental fact that there is a lessened tendency to hyperglycemia on carbohydrate ingestion after thyroidectomy has stimulated the New York investigators to suggest that the removal of thyroid tissue might lower the blood sugar in diabetes mellitus, possibly with beneficial results. This is at present nothing more than a speculation; but it is one not devoid of immediate interest and suggestiveness in relation to human pathology.

1. Underhill, F. P., and Blatherwick, N. R.: Studies in Carbohydrate Metabolism, VI, The Influence of Thyreoparathyroidectomy upon the Sugar Content of the Blood and the Glycogen Content of the Liver, Jour. Biol. Chem., 1914, **18**, 87.

2. Janney, N. W., and Isaacson, V. I.: The Influence of Thyroidectomy on the Blood Sugar, Proc. Soc. Exper. Biol. and Med., 1917, **14**, 99.

## PREYING ON THE YOUNG SOLDIER

Writes a physician:

"The enclosed envelope with contents was sent to my son, who is drafted for the Army. Evidently all of these boys are getting it. Something ought to be done to protect the boys."

The envelope contained a card on one side of which was printed a picture of the "Heart of Hot Springs, Ark.," headed "World's Garden of Health Controlled by U. S. Government." On the other side the Microzone Medicine Company of Hot Springs, Ark., advertises "the only treatment which will positively cure inherited or contracted specific blood poison permanently." Further, the recipient is told that "out of 7,000 patients who have taken our treatment . . . not one has failed to be cured permanently. Many were cured privately at home by mail. . . ." In addition to the card, the envelope contained two crude facsimiles of ten dollar Confederate bills, on the back of which "Microzone," the "King of all treatments for blood poison," was advertised—"$25 for full treatment!" The Microzone Medicine Company, according to material in our files, is operated by a quack, one J. M. Byrd, whose license the Arkansas authorities revoked in 1913. In a letter written in 1914 Byrd said: "I am now confining myself to the sale of a syphilitic cure . . . and I can make more money in that way and make it much easier than to do a general practice." At the same time Byrd was advertising a pamphlet with a salaciously suggestive title. Now, it would seem, Mr. Byrd would make more easy money by selling a fake syphilis cure to the young men who make up the National Army. Some men make a living out of war by robbing the dead on the battlefields; they at least do not impair the efficiency of the army. Other men rob the boys in khaki while they live, taking both money and health. They do this at a safe distance from the firing line and use as an instrument the United States mails.

## RUNNING TRUE TO FORM

"Form," "style," "type" or "character" signifies that indefinable something in every man that enables one to know what is the height of that man's possible achievement and what he may be counted on to do under any given circumstance. Therefore, when a motley crew of long-haired individualists were driven from pillar to post in their efforts to hold a meeting for the purpose of deriding the government and hindering its efforts in the war, when they finally found a haven in Chicago and were given police protection by its burgomaster; when finally they assembled to hear their favorites orate and berate from the rostrum, who occupied that exalted position? None other than Nuxated Iron Mason, whose blood — "nuxated" — runs cold at the thought of Americans going to war, and ex-Senator Works, the "old reliable," who, when in the Senate, could always be counted on to obstruct any measure for the good of the public health. Here they were again — running true to form.

## POPULAR IMPRESSIONS ABOUT DENTAL CARIES

The subject of dental caries has long been actively debated both by the few who have given some scientific attention to the problems of defective teeth, and by the many who are satisfied with hasty and haphazard, empiric generalizations as a basis for the diffusion of information. In this field, as in so many others, the acquisition of more accurate information has served to dispel many of the illusions fostered by the propaganda of years. Every item of dependable knowledge about dental decay is doubly welcome at the present time, when the medical examination of thousands of the young men of America in the prime of life is exhibiting an almost appalling condition of the teeth. Furthermore, every device of clever advertising is being employed to win converts to some particular form of tooth powder, paste or mouth wash on the basis of the unguarded statements of enthusiastic manufacturers who understand the psychology of the purchasers. A recent investigator[1] has contributed evidence of the unreliability of two of the more popular impressions about the teeth. One is that the teeth of primitive races are relatively immune to caries. This is not borne out by inquiry as to the conditions of such peoples from different parts of the world. Many of them seem to be quite as subject to toothache as is the average American. The second negatived popular impression is that which has associated dental caries with a diet preponderating in carbohydrate. Protein-eating races are apparently quite as susceptible to these tooth defects. Meat eaters have no advantage over the vegetarians. Perhaps it will appear that the prevention of stagnation within the oral cavity is a far more potent factor in the freedom from caries than the indefinite feature of the chemical type of the diet. In any event, there is little basis for the cocksure claims which support the panaceas to which our public is so partial.

1. Marshall, J. A.: The Composition of Saliva in Relation to the Incidence of Dental Caries, Am. Jour. Physiol., 1917, **43**, 212.

## THE FATE OF INOSITE IN THE BODY

The repeated attempts in recent years to find a place for phytin and similar organic compounds of phosphoric acid in human therapy lend interest to the physiology of the constituent groups. The futility of expecting any unique advantage from the phosphoric acid component because it is administered in the form of an ester or some comparable organic derivative has been clearly exposed in THE JOURNAL.[1] In addition to phosphoric acid, phytin and analogous plant products yield inosite, $C_6H_{12}O_6$, a compound highly suggestive of carbohydrate relationships, though it is in reality hexahydroxybenzene. In the past, experiments with inosite have indicated that it is not readily utilized.[2] A considerable amount may disappear when administered by mouth; but this destruction of inosite has usually been ascribed to the action of the intestinal flora. Recently, however, Greenwald and Weiss[3] of the Harriman Research Laboratory at the Roosevelt Hospital, New York, have tested the fate of inosite in animals rendered diabetic with phlorizin. The results indicate that inosite may be converted into glucose in the living organism, though the process is slow and incomplete. This instance of the somewhat remarkable chemical transformation of a benzene derivative into a sugar in the body does not give any new hope, however, to those who would endow inosite with some special pharmacologic or therapeutic potency.

## AN APPEAL FOR BELGIAN AND FRENCH PHYSICIANS

In THE JOURNAL for July 21 and August 25 Dr. W. W. Keen appealed for contributions to be used to rehabilitate the physicians of Belgium and northern France, particularly in the regions from which the Germans have been driven, and which now are being reinhabited and restored. Up to the present time, Dr. Keen writes, his appeals have not met with an encouraging response. This may be due to the enormous and continuous demands on every one because we ourselves are now involved in the war. Dr. Keen suggests that there should be no delay; that funds are sadly needed now to secure office furniture, instruments, appliances, and other medical necessities. Houses are already being built, and people are gathering in villages and towns that have been desolate. All this means accidents, sickness and the immediate need of the doctor. Without office furniture, without instruments — in fact, without anything except willing heads, hands and feet — the physicians are seriously handicapped in the charitable work they are attempting to do. We hope that the response to the appeal will be instantaneous and generous, so that there may be immediate relief to the present depressing situation. Dr. Keen will acknowledge through THE JOURNAL all contributions he may receive. He should be addressed at 1729 Chestnut Street, Philadelphia.

1. The Nutrient Value of Inorganic Salts of Lime and Phosphoric Acid, editorial, THE JOURNAL A. M. A., Aug. 15, 1914, p. 581. Phytin—Fortossan, Propaganda, Jan. 30, 1915, p. 456. Inosite as a Food, Miscellany, Sept. 16, 1916, p. 900.
2. For the literature see Anderson, R. J.: Jour. Biol. Chem., 1916, **25**, 391.
3. Greenwald, I., and Weiss, M. L.: The Fate of Inosite Administered to Dogs, Jour. Biol. Chem., 1917, **31**, 1-14.

## Medical Mobilization and the War

*"The purposes of the United States in this war are known to the whole world—to every people to whom the truth has been permitted to come. They do not need to be stated again. We seek no material advantage of any kind. We believe that the intolerable wrongs done in this war by the furious and brutal power of the imperial German government ought to be repaired, but not at the expense of the sovereignty of any people—rather a vindication of the sovereignty both of those that are weak and those that are strong."*

### MEDICAL MILITARY INFORMATION FOR PHYSICIANS

The pamphlets listed below will be sent on receipt of a self-addressed envelope and the postage stated.

1. The Medical Officer of the Army, by Lieut.-Col. William M. Bispham, M. C., U. S. Army, including also articles by Lieut.-Col. Robert E. Noble, M. C., U. S. Army; Col. T. H. Goodwin, C. M. G., D. S. O., and several supplements. 82 pages, 6 cents.

2. What the Civilian Physician Called to Active Service With the Army Should Know, by Lieut.-Col. William J. H. Lyster, M. C., U. S. Army. 16 pages, 2 cents.

3. G. O. 66 and Circular No. 2, Rules for the Examination of Recruits. 2 cents.

4. Bulletin VII. Army Service Schools. General Information for Officers Entering Service in Medical Reserve Corps. 2 cents.

5. Mode of Infection, Means of Prevention and Specific Treatment of Epidemic Meningitis, by Simon Flexner, M.D. 2 cents.

### Medical Students and Hospital Interns May Join the Enlisted Reserve Corps and Be Discharged by Local Board from Service in the National Army

The Provost Marshal General has sent the following to the governors of all states:

The President prescribes the following Supplemental Regulations governing the execution of the selective service law:

First. Hospital interns who are graduates of well-recognized medical schools or medical students in their fourth, third, or second year in any well-recognized medical school who have not been called by a local board may enlist in the Enlisted Reserve Corps provided for by Section 55 of the National Defense Act under regulations to be issued by the Surgeon-General, and if they are thereafter called by a local board they may be discharged on proper claim presented on the ground that they are in the military service of the United States.

Second. A hospital intern who is a graduate of a well-recognized medical school or a medical student in his fourth, third, or second year in any well-recognized medical school, who has been called by a local board and physically examined and accepted and by or in behalf of whom no claim for exemption or discharge is pending, and who has not been ordered to military duty, may apply to the Surgeon-General of the Army to be ordered to report at once to a local board for military duty and thus be inducted into the military service of the United States, immediately thereupon to be discharged from the National Army for the purpose of enlisting in the Enlisted Reserve Corps of the Medical Department. With every such request must be inclosed a copy of the order of the local board calling him to report for physical examination (Form 103), affidavit evidence of the status of the applicant as a medical student or intern and an engagement to enlist in the Enlisted Reserve Corps of the Medical Department.

On receipt of such application with the named inclosures the Surgeon-General will forward the case to the Adjutant-General with his recommendations. Thereupon the Adjutant-General may issue an order to such intern or medical student to report to his local board for military duty on a specified date, in person or by mail or telegraph, as seems most desirable. This order may issue regardless of the person's order of liability for military service. From and after the date so specified such person shall be in the military service of the United States. He shall not be sent by the local board to a mobilization camp, but shall remain awaiting the orders of the Adjutant-General of the Army. The Adjutant-General may forthwith issue an order discharging such person from the military service for the convenience of the Government.

Three official copies of the discharge order should be sent at once by the Adjutant-General to the local board. On receipt of these orders the local board should enter the name of the man discharged on Form 164A and forward Form 164A, together with one of the certified copies of the order of discharge, to the mobilization camp to which it furnishes men. The authorities at the mobilization camp will make the necessary entries to complete Form 164A, and will thereupon give the local board credit on its net quota for one drafted man.

### British Hospital Ship in Canal Zone

A British hospital ship carrying several hundred wounded men from New Zealand to England recently passed through the Isthmian Canal, and a magnificent reception was given them by the people of Colon during their stay of two days at that port.

### Osler's Son Dies from Wounds

Second Lieut. Edward Osler, R. A., only son of Sir William Osler, died in England, August 31. He was wounded recently while on active duty in France, and had been taken to England for treatment.

## NEWS OF THE TRAINING CAMPS

### Experiences of a Rookie on His First Day at Fort Benjamin Harrison, Indiana

The medical officers' training camp at Fort Benjamin Harrison has been in active running order since June 1, 1917, and has been growing like the proverbial Topsy from that date till the present time. The total number of undergraduate and graduate student officers is now approximately 1,400, most of whom are members of the Medical Reserve Corps. There are, however, numerous National Guardsmen among the number, and a few men who have passed their preliminary examinations for the regular army and are taking the same course as the others in order to qualify for their commissions.

The medical rookie immediately realizes that he is here for business. His first adventure is usually a mile walk from a small country station to the camp. If he has been unlucky enough to arrive on an early train to which no dining car is attached he is apt to make for a small refreshment stand just outside the station, only to be held up by a firm but politely smiling sentry, who informs him that the joint is run by a bunch of hold-up men and that no soldiers are allowed to patronize it. Disappointed but hopeful, he grasps his suitcase and sets his face campward. There will be breakfast awaiting him there beyond a doubt; it is only 7:15 a. m.

On arrival within the line of wooden barracks he soon realizes that he has not lost his way, because he is greeted with the cheery salutation of "Hello Doc" from scattered groups of bronzed veterans. From others more waggishly inclined come cries of "Where's your orderly, Doc?" "Did you bring your side-arms?" "How about those spurs, Doc?"

From this breezy welcome he forms two conclusions, first that he is among friends, and second that there must be something unusual about his personal appearance. So being a trained observer he soon decides that his spotless officers' serge and cap are at fault, and makes a mental note to remedy the condition at the first opportunity.

Having found the Adjutant's Office he shows his War Department telegram for purposes of identification, dictates his personal history to a sergeant, and is assigned to quarters. Right here it should be said that this official telegram is the most essential part of any officers' equipment. If he becomes separated from this he may as well give up hope of ever getting any pay or consideration of any kind.

His quarters are found to consist of a space 5 feet wide by 8 feet long in a wooden barracks. As his baggage has not arrived he moves round the barracks making the acquaintance of his company mates. On inquiring timidly as to the chances of getting a little breakfast he finds that this function is already a thing of the past, and that the cooks are preparing for dinner. He therefore resigns himself to starvation

and the tedium of waiting. In due course of time his baggage arrives by army mule team and he has the privilege of acting as his own porter between the A.-G.'s office (Adjutant-General) and the barracks. With feverish haste he tears open his army locker and doffs the spotless serge and cap in favor of cotton breeches, O. D. wool shirt, and campaign hat.

Attired then like a veteran he sallies forth to inspect his surroundings and get some idea of the schedule ahead of him. He finds the general plan of the camp very simple. Each company has two wooden barracks, one of which is partitioned at one end in order to form a small executive office for the instructors in charge. The barracks are approximately 90 feet long by 20 feet wide, and are arranged to house from forty to fifty men each. Each company also has its own mess hall, a building of similar construction, which is also partitioned at one end so as to form a kitchen and pantry. Finally, each company is supposed to have its own latrine, though lack of construction materials has delayed the construction of some of these units. They are supplied with water-closets, running water, and excellent shower baths, with hot and cold water and concrete floors.

The schedule of the recruit's first day is of necessity somewhat casual, much of it being spent in getting settled and learning the way about. The few necessary supplies which he may have overlooked in his packing are easily found at the quartermaster's store, where all manner of military equipment may be secured at the most reasonable of prices. The morning, therefore, is chiefly occupied with these minor errands, and is wound up by a talk from one of the company instructors—usually a National Guardsman who has seen service on the border—covering the subjects of camp customs, uniforms, salutes, and hours for rising, eating, and retiring. The noon meal, so eagerly anticipated, is delayed an hour or so because the company mess has not as yet been started and it is therefore necessary to borrow the hospitality of one of the older companies and to wait until their meal is over and the tables reset. In the afternoon some preliminary drill is tried by those of the company who have arrived, and the rest of the time is given over to the business of getting settled. The thought of roll call at 5:30 a. m. is sufficient to send most men to bed at a very early hour, usually an hour or more before the official time for "lights out" (10 p. m.).

Our medical rookie, therefore, may be left to enjoy an untroubled repose. Having by special request of the C. O. discarded all the insignia of rank, and by his action assumed the status of a cadet for the instruction period, he retires to his rest with a feeling that he is now to have a real chance of getting at the work for which he has—possibly at considerable personal sacrifice—volunteered his services.

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## Fort Oglethorpe

The week of August 20 was one of the most eventful weeks, since the organizing of this training camp. It marked the completion of the first course, and over 400 medical officers graduated and were sent to camps Dix, Lee, Mead, Wheeler, Gordan, Jackson, Hancock, etc.

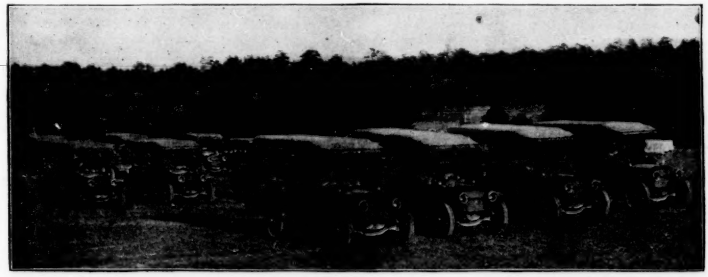
### VISITORS OF THE WEEK

Colonel Goodwin of the British Medical Service, Colonel Dercle of the French Medical Staff, Colonels Munson and Lagarde of the Surgeon-General's Office, Major Bloodgood of Johns Hopkins University and Prof. Alonzo Taylor of the Bureau of Conservation of Food were among the distinguished visitors and speakers who visited the camp during the week. Col. Henry Page, commandant, arranged the greatest review of medical officers and sanitary troops ever held in the history of the United States, in honor of the officers above mentioned. Colonel Dercle stated that had he not witnessed it he would not have believed that men could have been trained so well in so short a period of time. Colonel Goodwin, who has been connected with the British General Staff, and under whose direction hundreds, if not thousands, of medical officers have been trained, stated that he had never witnessed anything so impressive and had never seen such efficiency in medical troops who had been trained for six months, or more, as was shown by the review of men who had been in training for less than three months. He congratulated the commandant and his staff of instructors for the magnificent way in which their untiring efforts had produced these results.

### THE REVIEW

The troops were led by two battalions of medical officers, consisting of 1,400 men, under the command of Majors Derby and Boyd; these were followed by regimental sanitary detachments, field hospital units and ambulance companies fully equipped, and the National Guard sanitary detachment. There were over 5,000 men in the line, which took over an hour to pass the reviewing officer.

At the conclusion of the review there was a demonstration of the method of establishing a regimental aid and ambulance dressing station, and in the setting up of a field hospital. A demonstration was then given of the way in which the medical personnel evacuated a battlefield of the wounded following an engagement; the various first aid methods employed, and to how great an extent the ingenuity of the individual man is brought out in the devising and the utilizing of what he has in immobilizing the injured parts. The method of transporting the wounded to the first aid station was then shown, how the litter bearers transport wounded to the waiting ambulance, thence to the dressing station, where dressings were reapplied, if necessary, and how finally the wounded were transported by other ambulances to the field hospital.



Ambulances in Review at Fort Oglethorpe

### SPECIAL LECTURES

Colonel Dercle gave a very interesting talk during the week on the methods of handling the sick and wounded of the French army. Colonel Goodwin gave a series of three lectures on the British Medical Service and his experiences during retreat from Mons to the Marne. His simplicity and whole heartedness quite won the hearts of the entire camp. Colonel Lagarde, who is one of our greatest authorities on gunshot wounds, gave a series of five most instructive and interesting lectures on that subject. Prof. Alonzo E. Taylor gave a brilliant talk and brought out the necessity of all the people of this country aiding in the conservation of food stuffs.

### PERSONAL NEWS

Major Raymond C. Turck, adjutant of the camp, has been appointed chief sanitary inspector at Camp Wheeler, Ga. His duties have been taken up by Capt. Walter Weiser, who will act as adjutant for the next camp. Capt. Damon Pfeiffer has been appointed assistant adjutant.

Major William Pepper has been visiting his family in Philadelphia for the past ten days.

Major John E. Boyd has been appointed major of the First Battalion of student officers.

Mrs. Richard Derby, formerly Ethel Roosevelt, has been visiting her husband, Major Richard Derby, who is in command of the Second Student's Battalion.

Col. Henry Page, commandant, entertained at dinner Saturday evening at the Chattanooga Country Club, his guests were: Colonels Goodwin, Dercle, Munson, Lagarde and Prof. Alonzo Taylor.

The following is the tentative list of instructors for the next camp: captains, Walter R. Weiser, Damon B. Pfeiffer, Davis W. Parker; majors, William Pepper, Richard Derby, John E. Boyd; first lieutenants, James Burnie Griffin, George M. Piersol, Albert McConnaghy, Gilbert W. Brehm and Russel Jones.

JUNIOR INSTRUCTORS

Captains, Blase Cole, Edward J. D. Beardsley; first lieutenants, Newdegate M. Owensby, Theodore Le Boutillier, Robert E. Seibel, William Wilmerding and William H. McLain.

## Orders to Officers of the Medical Corps

Officers of M. C. to Camp Dix, Wrightstown, N. J., 78th Division, for duty: Lieut.-Cols. George M. Ekwurzel and John W. Hanner.

Officers of M. C. to Camp Travis, Fort Sam Houston, Texas, 90th Division, for duty: Lieut.-Cols. Robert H. Person and Paul S. Halloran.

First Lieut. Frederick E. Thode, M. C., to Fort Clark, Texas, for duty as C. O., Field Hospital Co. No. 30.

First lieutenants of M. C. to stations as follows to command ambulance companies named: Roy M. Fortier to Fort Clark, Texas, No. 28; Harvard C. Moore to Fort Clark, Texas, No. 29; Charles W. Riley to Fort Clark, Texas, No. 30.

Col. Charles Lynch, M. C., to Base Hospital No. 2, El Paso, for duty.

Lieut.-Col. Patrick H. McAndrew, M. C., at Fort Bliss, to Fort William H. Seward, Alaska, for duty.

Lieut.-Col. Frank W. Weed, M. C., to Camp Funston, Fort Riley, Kan., 89th Division, as sanitary inspector.

Officers of M. C., to Camp Pike, Little Rock, Ark., 87th Division, for duty: Lieut.-Col. Robert M. Thornburgh, chief surgeon; Major Charles E. Freeman, sanitary inspector.

Lieutenant colonels of Medical Corps to Camp Sherman, Chillicothe, Ohio, 83d Division, duty: Samuel J. Morris, as sanitary inspector; Wallace DeWitt, as chief surgeon.

Lieut.-Col. Robert M. Blanchard, M. C., to Camp Shelby, Hattiesburg, Miss., 38th Division, duty as chief surgeon.

Officers of M. C. to Camp Lee, Petersburg, Va., 80th Division, duty: Lieut.-Col. Charles E. Marrow as chief surgeon; Major Henry P. Carter as sanitary inspector.

Officers of M. C. to Camp Lewis, American Lake, Wash., 91st Division duty: Lieut.-Col. Lloyd L. Smith as sanitary inspector.

Major Robert H. Pierson, M. C., to Camp Travis, Fort Sam Houston, Texas, for duty as division sanitary inspector.

Majors of M. C. to camps opposite their names for duty as division sanitary inspectors, Nat. Army: John W. Hanner, Camp Devens, Ayer, Mass.; William A. Powell, Camp Dix, Wrightstown, N. J.

Major Earl H. Bruns, M. C., to Washington for duty.

Major Frank W. Weed, M. C., to Camp Funston, Fort Filey, as division sanitary inspector, Nat. Army.

Col. Page and Staff of Instructors at Medical Officers' Training Camp Attending Review at Fort Oglethorpe

Officers of M. C. to Camp Upton, Yaphank, Long Island, N. Y., 77th Division, for duty: Lieut.-Cols. Charles R. Reynolds and Major Alvin W. Schoenleber.

Officers of M. C. to Camp Gordon, Atlanta, Ga., 82d Division, for duty: Lieut.-Col. Conrad E. Koerper and Major William T. Cade, Jr.

The following lieutenant-colonels, Med. Corps, will proceed to the places below named for duty as chief surgeons of their divisions: Craig R. Snyder to Camp McClellan, Anniston, Ala., 29th Div.; Louis C. Duncan to Camp Wheeler, Macon, Ga., 31st Div.; Levy M. Hathaway to Camp Logan, Houston, Texas, 33d Div.; Jacob M. Coffin to Camp Cody, Deming, N. M., 34th Div.; Wilson T. Davidson to Camp Doniphan, Fort Sill, Okla., 35th Div.; William M. Smart to Camp Beauregard, Alexandria, La., 39th Div.; Philip W. Huntington to Camp Meade, Annapolis Junction, Md., 79th Div.; James M. Phalen to Camp Grant, Rockford, Ill., 86th Div.; John L. Shepard to Camp Funston, Fort Riley, Kan., 89th Div.; Orville G. Brown to Camp Fremont, Palo Alto, Calif., 41st Div.

Officers of M. C. to Camp Taylor, Louisville, Ky., 84th Division, for duty: Lieut.-Col. John H. Allen and Major Luther R. Poust.

Lieut.-Col. Llewellyn P. Williamson, M. C., to duty at Camp Devens, Ayer, Mass.

Major Ernest G. Bingham, M. C., is designated C. O., medical officers' training camp, at Fort Des Moines.

Major Guy V. Rukke, M. C., Plattsburg, N. Y., to Fort Porter, N. Y., assuming command of Base Hospital No. 2.

Capt. Shelley U. Marietta, M. C., to Fort Clark, Texas, for duty as C. O., Field Hospital Co. No. 28.

Capt. George B. Lake, M. C., Fort Clark, Texas, to study as C. O., Field Hospital Co. No. 29.

Capt. Hiram A. Phillips, M. C., to Detroit, Mich., assuming command of Base Hospital No. 36.

Capt. Harry R. Beery, M. C., to Indianapolis, Ind., assuming command of Base Hospital No. 32.

Officers of M. C. to the camps indicated opposite their names for duty as division sanitary inspectors, Nat. Army: Major Howard H. Baily, Camp Rockford, Ill.; Major Charles E. Freeman, Camp Pike, Little Rock, Ark.; Major Philip W. Huntington, Camp Meade, Annapolis Junction, Md.; Major Samuel J. Morris, Camp Sherman, Chillocothe, Ohio; Major Lloyd L. Smith, Camp Lewis, American Lake, Wash.; Major Thomas J. Leary, Colon, Camp Jackson, Columbia, S. C.; Capt. Guy L. Qualls, Camp Custer, Battle Creek, Mich.

Captains of M. C. to duty at camps named as division sanitary inspectors, Nat. Army: William T. Cade, Jr., Camp Gordon, Atlanta, Ga.; Henry P. Carter, Camp Lee, Petersburg, Va.; Clarence E. Fonk, Camp Dodge, Des Moines, Iowa; Luther R. Poust, Camp Taylor, Louisville, Ky.; Alvin W. Schoenleber, Camp Upton, Yaphank, N. Y. (August 22, Ward D.), inspector; Major Peter C. Field as chief surgeon.

Officers of M. C. to duty, Camp Dodge, Des Moines, Iowa, 88th Division: Lieut.-Col. Jay R. Shook as chief surgeon; Major Clarence E. Fronk as sanitary inspector.

Officers of M. C. to Camp Custer, Battle Creek, Mich., 85th Division, for duty: Lieut.-Cols. William A. Powell as sanitary inspector; Cosam J. Bartlett as chief surgeon.

Lieutenant colonels of M. C. to recruit depot specified after his name for duty: Powell C. Fauntleroy, Fort McDowell, Calif.; Joseph T. Clarke, Jefferson Barracks, Mo.; Allen M. Smith, Fort Logan, Colo.; Francis M. C. Usher, Fort Slocum, N. Y.

Lieut.-Col. George A. Skinner, M. C., from Nogales, Ariz., to San Antonio Base Hospital 1, for duty.

Officers of M. C. to Camp Devens, Ayer, Mass., Seventy-Sixth Division, for duty: Major Joseph L. Siner as sanitary inspector; Major Llewellyn P. Williamson as chief surgeon.

Capt. William K. Bartlett, M. C., to Walter Reed General Hospital, Takoma Park, D. C., treatment.

Capt. William Denton, M. C., to station and duty at Fort Ethan Allen, Vt.

The following lieutenant colonels, M. C., to duty as chief surgeons at camps named: Perry L. Boyer to Camp MacArthur, Waco, Texas, Thirty-Second Division; Raymond F. Metcalfe to Camp Bowie, Fort Worth, Texas, Thirty-Sixth Division; Kent Nelson to Camp Jackson, Columbia, S. C., Eighty-First Division; Alexander Murray to Camp Kearney, Linda Vista, Calif., Fortieth Division; Major Arthur M. Whaley to Camp Sevier, Greenville, S. C., Thirtieth Division, as chief surgeon.

## Orders to Officers of the Sanitary Corps

Capt. John F. Krauser, Sanitary Corps, to duty at Fort Mason, S. F., Calif.

First Lieut. Harvard D. Moyer, Sanitary Corps, to duty at Field Medical Supply Depot, Washington.

First Lieut. Daniel Millen, Sanitary Corps, to Camp Sevier, Greenville, S. C., as medical supply officer of division and property officer of base hospital at Camp Sevier.

First Lieut. Gustave Fonteyne, Sanitary Corps, to Camp Green, Charlotte, N. C., as medical supply officer of the division and property officer of base hospital.

First Lieut. Patrick Haughey, Sanitary Corps, to Camp Dix, Wrightstown, N. J., as medical supply officer of the division and property officer of the base hospital at Camp Dix.

Major James Ten Broeck Bowels, S. C., to duty at Washington.

## Orders to Officers of the Medical Reserve Corps

### ALABAMA

*To Fort Ethan Allen, Vt.*, as drillmaster and instructor for hospital corps, Lieut. G. C. Kilpatrick, Irvington.

### ARIZONA

To report by telegraph to the commanding general, Lieut. Sidney C. Williams, Chin Lee.

### ARKANSAS

*To Camp Lewis*, American Lake, Wash., as roentgenologist, Lieut. F. E. Diemer, Hot Springs.

*To Camp Pike*, Little Rock, to duty at base hospital, H. W. Graves, Elm Springs; S. J. Fuller, Little Rock; I. S. Butler, Marshall; J. S. Jenkins, Pine Bluff, and W. K. Read, Texarkana.

*To Fort Oglethorpe* for a course of instruction, Lieut. Robert E. Weaver, Hope.

### CALIFORNIA

*To Camp Fremont*, Palo Alto, Capt. Shadworth O. Beasley, San Francisco; for duty in connection with camp laboratory, Lieut. R. L. Rierson, Oakland.

*To Camp Kearney*, Linda Vista, for duty, Lieut. Sylvan L. Haas, San Francisco.

*To Jefferson Barracks, Mo.*, for duty, Lieut. Caro W. Lippman, San Francisco.

*To Letterman Hospital, S. F.*, for duty, Lieut. C. L. Tranter, San Francisco.

To command Base Hospital No. 34, Philadelphia, Capt. R. G. DeVoe, Fort McDowell.

To report by telegraph to commanding general, Western Department, for assignment to duty, Capts. Alonzo DeM. Snyder, Corning; Charles B. Hare, San Jose; Lieut. William Friedberger, French Camp.

To University of California as cardiovascular examiner, Lieut. William J. Kerr, Sebastopol.

### CANAL ZONE

*To Camp Jackson, Columbia, S. C.*, Eighty-First Division, Major T. J. Leary, Cristobal.

*To Camp Meade*, Annapolis Junction, Md., with Seventy-Ninth Division, Major G. L. Qualles, Ancon.

*To Camp Sevier*, Greenville, S. C., for duty in connection with camp laboratory, Lieut. D. O. Smith, Culebra.

To command Base Hospital No. 24, Tulane University, New Orleans, Capt. C. E. McBrayer, Cristobal.

### COLORADO

*To Denver*, for the purpose of enlisting the personnel of Red Cross Ambulance Co. No. 30, Capt. Thomas H. Hopkins, Denver.

*To Schofield Barracks, H. T.*, Capt. Arthur J. Markley, Denver.

### CONNECTICUT

*To Fort Ethan Allen, Vt.*, as drillmaster and instructor for hospital corps, Lieut. M. H. Griswold, Kensington.

### DISTRICT OF COLUMBIA

*To Camp Hancock*, Augusta, Ga., for duty, Lieut. Eugene Clarence Rice, Jr., Washington.

*To Camp Meade*, Annapolis Junction, Md., to duty at base hospital, Lieuts. George Von P. Davis, as roentgenologist, W. Van Sweringen, Washington.

*To Fort Clark, Texas*, with Ambulance Co. No. 30, Lieut. William H. Cade, Jr., Washington.

*To Fort Oglethorpe*, for a course of instruction, Lieut. William O. Wetmore, Washington.

### FLORIDA

*To Camp Dix*, Wrightstown, N. J., Lieut. William A. Clark, Pine Barren.

*To Fort Oglethorpe*, for a course of instruction, Lieut. Walter J. Baker, Loughridge.

### GEORGIA

*To Atlanta, Ga.*, for assignment to Red Cross Ambulance Co. No. 20, Lieuts. L. P. Daly and E. D. Shanks, Atlanta; E. W. Allen, Milledgeville; Spencer A. Kirkland, Zirkle.

*To Camp Grant*, Rockford, Ill., for duty, Lieut. James J. Beaton, Waycross.

*To Camp Wheeler*, Macon, for duty, Lieut. Wilborn A. Upchurch, Atlanta.

*To Fort Gordon*, Atlanta, to duty at base hospital, Capt. H. H. Malone, Lieuts. T. L. Davis, Augusta; R. E. Foster, Carrollton; B. C. Bird, Colquitt; F. Bird, Valdosta.

*To Fort Oglethorpe*, for a course of instruction, Lieut. De Lamar Turner, Milledgeville.

### ILLINOIS

*To Camp Dodge*, Des Moines, Iowa, as roentgenologist, Capts. W. G. Alexander, Evanston; to duty at base hospital, E. O. G. Franing, Galesburg; Lieuts. W. C. Bisson, Charleston; W. H. Byford, A. W. K. Downes, Chicago; C. M. Coen, Cornell.

*To Camp Grant*, Rockford, Ill., to duty at base hospital, Capts. J. Burry, A. R. Craig, W. Cuthbertson, Lieuts. H. G. Champlin, C. A. Jacobson, Chicago; C. C. Craig, Mount Carmel.

*To Camp Hancock*, Augusta, Ga., for duty with base hospital, Lieut. J. F. Miller, Palmer.

*To Fort Benjamin Harrison*, for a course of instruction, Lieut. George N. Pratt, Chicago.

*To Fort Ethan Allen, Vt.*, as drillmaster and instructor for hospital corps, Lieut. M. L. Puffer, Downers Grove.

*To Jefferson Barracks, Mo.*, for duty, Lieut. Robert B. Jack, Okawville.

### INDIANA

*To Camp Bowie*, Fort Worth, Texas, for duty, Capt. Joseph K. Worthington, Indianapolis.

*To Camp McClellan*, Anniston, Ala., Lieut. Arthur F. Weyerbacker, Indianapolis.

*To Fort Benjamin Harrison*, for a course of instruction, Lieut. E. J. Dubois, Indianapolis.

*To Fort Ethan Allen, Vt.*, as drillmaster and instructor for hospital corps, Lieut. O. A. Newhouse, Montezuma.

### IOWA

*To Camp Cody, N. M.*, for duty in connection with laboratory work, Lieut. Theodore W. Kemmerer, Davenport.

*To Camp Dodge*, Des Moines, in connection with venereal diseases, Lieut. A. H. Konigmache, Missouri Valley.

*To Camp Lee*, Petersburg, Va., as roentgenologist, Capt. E. A. Merritt, Council Bluffs.

*To Camp Travis*, Fort Sam Houston, Texas, to duty at base hospital, Capts. B. R. Johnston, Cedar Rapids; L. B. Carson, Maquoketa; for duty, Lieut. Henry E. Kleinberg, Redfield.

*To Fort Ethan Allen, Vt.*, for duty, Lieut. R. E. Robinson, Waverly.

### KANSAS

*To Camp Funston*, Fort Riley, Kan., to duty at base hospital, Capt. P. Christmann, Parsons; Lieuts. J. B. Brickell, Americus; J. Welch, Herington; M. Newlon, Lincoln; I. B. Chadwick, Tyro; in connection with venereal diseases, Lieut. R. W. Hissem, Wichita.

*To Camp Taylor*, Louisville, Ky., to duty at base hospital, Lieut. W. H. Neel, Wellington.

### KENTUCKY

*To Camp Logan*, Houston, Texas, as chief of surgical service, Capt. John H. Blackburn, Bowling Green.

*To Camp Taylor*, Louisville, Ky., Lieuts. William H. Neel, Bowling Green; Calude Wilson, Greenville; James A. Grider, Smith Grove; to duty at base hospital, C. B. Willmott, Lexington; E. T. Gallagher, Somerset; H. L. McLean, Willmore; in connection with venereal diseases, V. N. Meddis, Louisville.

*To Fort Benjamin Harrison*, for a course of instruction, Lieut. D. C. Donan, Morganfield.

*To Fort Oglethorpe*, for a course of instruction, Lieuts. John W. Stephenson, Ashland; J. H. Pritchett, Louisville.

To command Base Hospital No. 31, Youngstown, Ohio, Capt. A. E. Schlanzer, Fort Thomas.

### LOUISIANA

*To New Orleans*, for duty, Major I. Dyer, New Orleans.

### MAINE

*To Camp Devens*, Ayer, Mass., in connection with venereal diseases, Capt. G. A. Pudor, Portland.

*To Camp Funston*, Fort Riley, Kan., as roentgenologist, Lieut. E. S. Cummings, Lewistown.

To report in person to the commanding general, Southern Department, for duty, Capt. Edson E. Goodrich, Waterville.

### MARYLAND

*To Camp Doniphan*, Fort Sill, Okla., as roentgenologist, Lieut. F. N. Hoffmeier, Hagerstown.

*To Camp Meade*, Annapolis Junction, Md., to duty at base hospital, Lieuts. E. F. Gott, A. Shelley, H. N. Sisco, Baltimore; Winter R. Frantz, Cumberland; Thomas J. Coonan, Westminister.

*To Fort Bayard, N. M.*, for duty, Lieut. Cranfield H. Douthirt, Baltimore.

### MASSACHUSETTS

*To Camp Devens*, Ayer, Mass., to duty at base hospital, Capts. C. O. Kepler, Boston; E. A. Darling, Cambridge; Lieuts. W. G. Stickney, Beverly; E. S. Winslow, Easthampton; Robert L. Jones, Lowell, J. M. Tracy, Springfield.

*To Camp Green*, Charlotte, N. C., as roentgenologist, Lieut. H. E. Carney, Boston.

*To Camp Hancock*, Augusta, Ga., as roentgenologist, Lieut. A. J. Horrigan, Springfield.

*To Camp MacArthur*, Waco, Texas, for duty in connection with laboratory work, Lieut. Leon S. Medalia, Boston.

*To Camp Shelby*, Hattiesburg, Miss., for duty, Lieut. William P. Boardman, Boston.

*To Fort Clark, Texas*, with Field Hospital Co. No. 28, Lieut. John F. McDonald, North Adams.

*To Fort Ethan Allen, Vt.*, for duty, Capt. H. E. Sears, Beverly; Lieut. R. C. Norris, Methuen.

*To Fort Sill, Okla.*, for a course of instruction at the Gas School, Lieut. N. W. Faxon, Stoughton.

MICHIGAN

*To Camp Custer*, Battle Creek, Mich., to duty at base hospital, Capt. W. E. Chapman, Cheboygan; Lieuts. W. A. Giffin, Deckerville; L. N. Tupper, Redford; for duty, Spencer Van Barnum, Coloma; in connection with venereal diseases, J. R. Coryell, Grand Rapids.

*To Detroit*, for the purpose of enlisting the personnel of Red Cross Ambulance Co. No. 28, Capt. Griffith A. Thomas, Detroit.

*To Flint*, for the purpose of enlisting the personnel of Red Cross Ambulance Co. No. 42, Capt. Floyd A. Roberts, Flint.

*To Memphis, Tenn.*, for the purpose of enlisting the personnel of Red Cross Ambulance Co. No. 45, Capt. Walter R. T. Sharpe, Romeo.

MINNESOTA

*To Fort Sill, Okla.*, for a course of instruction at the Gas School, Capt. J. C. Sessions, Minneapolis.

MISSISSIPPI

*To Camp Logan*, Houston, Texas, for duty in connection with camp laboratory, Lieut. E. R. Gordon, McComb.

*To Camp Shelby*, Hattiesburg, to base hospital as chief of the surgical service, Capts. Walter W. Crawford, as roentgenologist, W. R. Bethea, Hattiesburg.

*To Camp Travis*, Fort Sam Houston, Texas, to duty at base hospital, Lieut. C. C. Buchanan, Laurel.

MISSOURI

*To Camp Cody, N. M.*, for duty in connection with laboratory work, Lieut. Frederick A. Hecker, Kansas City.

*To Camp Dodge*, Fort Riley, Kan., in connection with venereal diseases, Capt. John Butler, Hawk Point.

*To Camp Funston, Kan.*, in connection with venereal diseases, Capt. W. L. McBride, Kansas City.

*To Camp Green*, Charlotte, N. C., for duty, Capt. James B. Clark, Springfield.

*To Camp Pike*, Little Rock, Ark., in connection with venereal diseases, Lieut. H. McC. Young, St. Louis.

*To Camp Travis*, Fort Sam Houston, Texas, in connection with venereal diseases, Capt. H. M. Moore, St. Louis.

*To Fort Clark, Texas*, with Field Hospital Co. No. 29, Lieut. Granvil L. Kerley, Kansas City.

*To Fort Ethan Allen, Vt.*, as drillmaster and instructor for hospital corps, Lieut. N. G. Hawley, St. Louis.

*To Kansas City, Mo.*, for the purpose of enlisting the personnel of Red Cross Ambulance Co. No. 24, Capt. Ernest W. Cavaness, Kansas City.

To report in person to the commanding general, Western Department, for duty, Capt. Frank D. Dickson, Kansas City.

NEBRASKA

*To Camp MacArthur*, Waco, Texas, for duty in connection with laboratory work, Lieut. Aldis A. Johnson, Omaha.

*To Fort Riley*, for instruction, Lieut. Samuel Earl Metheny, Cairo.

NEW HAMPSHIRE

*To Camp Pike*, Little Rock, Ark., as roentgenologist, Lieut. A. G. Straw, Manchester.

*To Camp Wheeler*, Macon, Ga., as roentgenologist, Lieut. A. F. Wheat, Manchester.

NEW JERSEY

*To Camp Dix*, Wrightstown, N. J., to duty at base hospital, Capts. J. N. Teeter, Englewood; M. J. Synott, Montclair; Lieuts. F. R. Corson, Atlantic City; B. A. Furman, Newark; W. A. Clark, Trenton; L. E. Poole, West Hoboken; as roentgenologist, J. B. Edwards, Leonia.

*To Camp Fremont*, Palo Alto, Calif., as roentgenologist, Lieut. J. L. Gariss, Trenton.

*To Camp Kearney*, Linda Vista, Calif., as roentgenologist, Lieut. H. B. Dean, Audubon.

*To Camp Sheridan*, Montgomery, Ala., for duty in connection with laboratory work, Lieut. Harrison S. Martland, Newark.

*To Fort Benjamin Harrison*, for a course of instruction, Lieut. Ambrose F. Bowd, Newark.

*To Fort Oglethorpe*, for a course of instruction, Lieuts. Martin W. Curran, Chatsworth; A. L. Ellis, Metuchen.

NEW YORK

*To Allentown, Pa.*, for duty, Lieut. W. G. Phillips, Jr., Brooklyn.

*To Camp Funston*, Fort Riley, Kan., to duty at base hospital, Lieut. R. J. Miller, New York City.

*To Camp Gordon*, Atlanta, Ga., to duty at base hospital, Lieut. C. E. Wills, New York City.

*To Camp Hancock*, Augusta, Ga., for duty, Capt. Joseph L. Donhauser, Albany.

*To Camp Logan*, Houston, Texas, for duty in connection with camp laboratory, Capt. T. H. Dexter, Brooklyn; as roentgenologist, Lieut. S. F. Weitzner, New York City.

*To Camp McClellan*, Anniston, Ala., for duty in connection with camp laboratory, Lieut. H. E. Meleny, New York City.

*To Camp Meade*, Annapolis Junction, in connection with venereal diseases, Lieut. C. M. Williams, New York City.

*To Camp Sevier*, Greenville, S. C., Capt. Abram S. Clark, New York City; as roentgenologist, Lieut. C. W. Woodall, Schenectady; for duty in connection with camp laboratory, Lieut. T. W. Jenkins, Albany.

*To Camp Travis*, Fort Sam Houston, Texas, as roentgenolgist, Lieut. D. S. Childs, Syracuse.

*To Camp Upton*, Yaphank, L. I., N. Y., to duty at base hospital, Capt. F. J. Cox, Albany; Lieuts. F. L. Barnum, Kingston, and A. J. Anderson, Long Island City; for duty, Lieuts. William J. Wansboro, Albany, and Russell LaF. Cecil, New York City.

*To Camp Wadsworth*, Spartanburg, S. C., as roentgenologist, Capt. U. S. Kann, Binghamton.

*To Fort Adams, R. I.*, to examine troops for tuberculosis, Lieuts. E. L. Draper and Clinton B. Hawn, Albany.

*To Fort Benjamin Harrison*, for a course of instruction, Lieuts. Reuben S. Simpson, Lyons, and S. Erdman, New York City.

*To Fort Ethan Allen, Vt.*, for duty, Capt. C. B. J. Mittelstaedt, Fisher's Island; Lieuts. F. Crounse, Albany; H. E. McGarvey, Bronxville; P. A. Reque, Brooklyn; J. A. Bennett, Elmira; I. W. Livermore, Gowanda; A. L. Tinkess, La Fargeville; R. S. Nelson and W. H. J. O'Brien, New York City; G. E. Stevenson, Penn Yann; G. J. Ganow, Port Dickinson; D. Ramsey, Smithtown Branch, and W. H. McShane, Troy.

*To Fort Jay*, for duty, Lieut. L. J. Ladinski, New York City.

*To Fort Oglethorpe*, for a course of instruction, Capt. George Draper, New York City.

*To Fort Riley, Kan.*, for duty, Lieut. Harry T. Lay, Saranac Lake.

*To Madison Barracks*, New York, Capt. Wilson G. Wood, Madison Barracks.

*To New York*, to examine Second Infantry, N. Y. N. G., for tuberculosis, Capt. A. MacFarlane, Albany.

*To Rockefeller Institute*, New York City, to report in person to Major Simon Flexner, for duty as assistant, Capt. E. F. Butler, Yonkers.

*To Spartanburg, S. C.*, for duty in connection with laboratory work, Lieut. Lemuel W. Gorham, Albany.

*To Syracuse, N. Y.*, in connection with enlistments for Red Cross Hospital Unit G., Major E. S. Van Duyn, Syracuse.

Honorably discharged, Lieut. C. E. Tracy, Castleton.

NORTH CAROLINA

*To Fort Oglethorpe*, with the Red Cross Ambulance Co. No. 31, Capt. Charles S. Lawrence, Winston-Salem; Lieuts. William E. Brackett, Caroleen, and John T. Benbow, East Bend.

OHIO

*To Allentown, Pa.*, for duty, Lieut. William J. Jones, Columbus.

*To Army Medical School*, Washington, D. C., for duty, Capt. Charles Goodman, Cleveland; Lieut. Thomas R. W. Wilson, Bakersville.

*To Camp Doniphan*, Fort Sill, Okla., for duty, Lieut. Chelsea A. Coleman, Dayton.

*To Camp Green*, Charlotte, N. C., for duty in connection with camp laboratory, Lieut. J. C. Placak, Cleveland.

*To Camp Sherman*, Chillicothe, to duty at base hospital, Lieuts. G. M. Logan, Akron; W. C. Gates, Bucyrus; J. W. Sheetz, Columbus, and R. B. Thompson, Salem.

To Fairfield, and report in person to the commanding officer, Flying School, Aviation Section, for duty as post surgeon, and by letter to the commanding general, Central Department, Capt. Courtney P. Grover, National Military Home.

*To Fort Sill, Okla.*, for a course of instruction at the Gas School, Lieut. G. W. Brehm, Columbus.

To report by telegraph to commanding general, Southern Department, for duty, Lieut. C. T. Smith, Columbus.

*To Syracuse, N. Y.*, for duty, Capt. Samuel Hindman, Columbus.

OKLAHOMA

*To Fort Oglethorpe*, for a course of instruction, Major Bertram E. Duckwall, Fort Sill.

*To Fort Riley*, for a course of instruction, Capt. W. E. Harrington, Wakita.

*To Fort Sill, Okla.*, for a course of instruction at the Gas School, Capt. B. C. Cole, Whitefield.

*To South San Antonio*, Kelly Field, for duty, Lieut. Sims D. Bevill, Poteau.

OREGON

To report by telegraph to commanding general, Western Department, for duty, Lieut. Floyd. D. Lewis, Silverton.

PENNSYLVANIA

*To Camp Beauregard*, Alexandria, La., for duty, Lieut. Lloyd Thompson, Homestead.

*To Camp Cody*, Deming, N. M., as roentgenologist, Lieut. L. S. Weaver, York.

*To Camp Custer*, Battle Creek, Mich., as roentgenologist, Lieut. T. L. McCullough, Homewood.

*To Camp Hancock*, Augusta, Ga., for duty, Lieut. Frank P. Strome, Scranton.

*To Camp Jackson*, Columbia, S. C., as roentgenologist, Capt. H. A. Greaves, Philadelphia; in connection with venereal diseases, Lieut. E. J. Braun, Farrel; to duty at base hospital, Lieuts. W. D. Gates, Indiana; E. T. Davies, Old Forge, and W. Van Korb, Philadelphia.

*To Camp Sheridan*, Montgomery, Ala., for duty in connection with laboratory work, Lieut. Charles B. Reitz, Allentown.

*To Camp Sherman*, Chillicothe, Ohio, to duty at base hospital, Lieuts. J. A. Shaffer, Toysburg, and A. B. Shatto, York.

*To Camp Sevier*, Greenville, South Carolina, for duty in connection with camp laboratory, Capt. A. C. Woods, Philadelphia.

*To Columbus Barracks, Ohio*, for duty, Capt. Alexander L. Gillars, Pottsville.

*To Fort Adams, R. I.*, to examine troops for tuberculosis, Lieut. J. P. O'Brien, Philadelphia.

*To Fort Benjamin Harrison*, for a course of instruction, Lieut. John R. Conover, Philadelphia.

*To Fort Ethan Allen, Vt.*, for duty, Capt. W. T. McConville, Honesdale, and Lieut. W. R. Campbell, East Smithfield.

*To Fort Oglethorpe*, for a course of instruction, Capt. James K. M. Perrine, Pittsburg, and Lieut. Anthony S. Maciejewski, Philadelphia.

*To Fort Sill, Okla.*, for a course of instruction at the Gas School, Capt. T. B. Appel, Lancaster.

*To Spartanburg, S. C.*, for duty, Lieut. John D. Jungmann, Philadelphia; for duty in connection with laboratory work, Lieut. Robert A. Keilty, Lansdowne.

*To Washington*, for duty with the Council of National Defense, Major Henry D. Jump, Philadelphia.

SOUTH CAROLINA

*To Camp Jackson*, Columbia, S. C., to duty at base hospital, Lieuts. E. W. Barron, Manning, and J. H. Pratt, Ninety Six.

*To Camp Lee*, Petersburg, Va., to duty at base hospital, Capt. W. Hope, Union.

*To Fort Ethan Allen, Vt.*, for duty, Lieut. J. D. Thomas, Loris.

*To Fort Oglethorpe*, for a course of instruction, Lieuts. George Walter, Orangeburg, and F. M. Harvin, Pinewood.

*To Greenville, S. C.*, for the purpose of enlisting the personnel of Red Cross Ambulance Company No. 32, Capt. James E. Daniels, Greenville.

TENNESSEE

*To Camp Sherman*, Chillicothe, Ohio, in connection with venereal diseases, Lieut. C. E. Barnett, Newport.

TEXAS

*To Austin, Texas*, for duty, Capt. Albert F. Beverly, Austin.

*To Camp MacArthur*, Waco, Texas, Lieut Richart M. Fancher, Houston; as roentgenologist, Lieut. E. V. Powell, Fort Worth.

*To Camp Travis*, Fort Sam Houston, Texas, to duty at base hospital, Lieuts. J. J. Gill, Lamasco, and B. F. Gibson, Lufkin.

*To Camp Upton*, Yaphank, Long Island, N. Y., to duty at base hospital, Lieut. E. C. Foster, Whitt.

To command Base Hospital No. 3 (Mount Sinai Hospital), New York, Capt. M. A. Dailey, Presidio.

*To Fort Clark, Texas*, with Ambulance Company No. 29, Lieut. Robert K. Lowry, Hubbard; with Field Hospital Company No. 30, Lieut. Levy S. Johnson, Richmond.

*To Fort Sam Houston*, for duty, Lieuts. A. L. Roberts, Myra, and Joseph A. L. Wolfe, Van Alstyne.

To report by telegraph to commanding general, Southern Department, for duty, Lieuts. Jackson S. Cooper, Dallas, and William H. Cooley, Sarita.

*To South San Antonio*, Kelly Field, for duty, Lieut. Jeffrey C. Michael, Houston.

UTAH

*To Camp Meade*, Annapolis Junction, Md., Lieut. George Von P. Davis, Salt Lake City.

VERMONT

*To Camp Dix*, Wrightstown, N. J., in connection with venereal diseases, Capt. W. W. Townsend, Rutland.

*To Fort Ethan Allen, Vt.*, for duty, Lieut. E. Bibby, Craftsbury.

VIRGINIA

*To Camp Lee*, Petersburg, Va., to duty at base hospital, Capts. S. B. Moore, Alexandria; E. M. Parker, Emporia, and Joseph W. Hope, Hampton; Lieuts. C. M. Easter, Chincoteague Island; P. C. Riley, Markham, apd I. H. Goldman, Richmond.

*To Newport News, Va.*, for duty, Lieut. Paul J. Parker, Hampton.

*To Richmond, Va.*, for instruction in military roentgenology, Lieut. R. A. Davis, Newport News.

WASHINGTON

*To Camp Fremont*, Palo Alto, Calif., for duty in connection with camp laboratory, Lieut. P. C. West, Seattle.

*To Camp Lewis*, American Lake, Wash., to duty at base hospital, Capt. F. P. Gardner, Seattle; Lieuts. P. I. Carter, Port Townsend; E. L. Bickford, Seattle; W. B. McNerthney, J. S. Smeall and H. J. Whitacre, Tacoma.

*To Camp MacArthur*, Waco, Texas, for duty in connection with laboratory work, Lieut. Harry H. Robinson, Spokane.

WISCONSIN

*To Camp Logan*, Houston, Texas, Lieut. Albert G. Jenner, Milwaukee.

*To Washington, D. C.*, in connection with preparation of a pamphlet on Plastic and Oral Surgery of the War, Capt. R. H. Ivy, Milwaukee.

*"The object of this war is to deliver the free peoples of the world from the menace and the actual power of a vast military establishment, controlled by an irresponsible government which, having secretly planned to dominate the world, proceeded to carry the plan out without regard either to the sacred obligations of treaty or the long established practices and long cherished principles of international action and honor; which chose its own time for the war; delivered its blow fiercely and suddenly; stopped at no barrier either of law or of mercy; swept a whole continent within the tide of blood—not the blood of soldiers only, but the blood of innocent women and children also, and of the helpless poor; and now stands balked but not defeated, the enemy of four-fifths of the world.*

# Medical News

(PHYSICIANS WILL CONFER A FAVOR BY SENDING FOR THIS DEPARTMENT ITEMS OF NEWS OF MORE OR LESS GENERAL INTEREST; SUCH AS RELATE TO SOCIETY ACTIVITIES, NEW HOSPITALS, EDUCATION, PUBLIC HEALTH, ETC.)

## ALABAMA

**Personal.**—Dr. Judson D. Dowling, Birmingham, has been elected health officer of Jefferson County, succeeding Dr. F. E. Harrington, resigned to reenter the United States service.——Dr. Burdett L. Arms, chief bacteriologist of the Alabama State Board of Health, Montgomery, has been appointed director of the bacteriologic Laboratories of the Florida State Board of Health, Jacksonville, succeeding Dr. Edward G. Birge, M. R. C., U. S. Army.——Dr. George A. Mershon, Fairhope, has been appointed assistant surgeon of the Soldiers' Home, Marshalltown, Iowa.——Dr. Hawkins D. Westmoreland, Huntsville, has been appointed local surgeon for the Southern Railroad, succeeding Dr. Felix E. Baldridge, deceased.——Major Middleton H. Hagood, Brewton, is convalescent after a surgical operation.

## CALIFORNIA

**Typhoid in Modesto.**—The seventh death in Modesto from typhoid fever since the opening of the epidemic occurred August 19.——Frank Holtham has been appointed sanitary inspector of Modesto, and is initiating an active clean-up campaign.

**Venereal Diseases Controlled.**—State Health Officer Sawyer has petitioned county supervisors to provide in their annual budget for hospital facilities for the care and isolation of patients suffering from venereal diseases. Governor Stevens has appropriated $60,000 from the state war emergency fund for the control of this problem.

**Will Require Intern Year.**—The College of Physicians and Surgeons, the medical department of the University of Southern California, Los Angeles, announces that students matriculating in the session of 1918-1919 and thereafter will be required to take a five-year course before obtaining the M.D. degree, the fifth year to be spent as an intern in a hospital acceptable to the senior faculty, or have its equivalent in other advanced clinical training.

## CONNECTICUT

**Personal.**—Dr. Simon R. Klein, formerly director of the Norwich research and experimental laboratory, has been appointed assistant superintendent, pathologist and roentgenologist to the Waldheim Park Sanitarium and Polyclinic, Oconomowoc, Wis.——Dr. Jeremiah D. Eggleston has been elected president of the board of trustees of the State School for Boys, Meriden.

## GEORGIA

**Personal.**—Dr. Henry W. Terrell, La Grange, has been appointed a member of the state board of medical examiners to succeed the late Dr. Francis M. Ridley, La Grange.——Dr. Clarence M. Paine, Atlanta, is reported to be critically ill in a hospital at Rochester, Minn., following a surgical operation.

**New Officers.**—The annual meeting of the First Congressional District Medical Society was held in Savannah, August 3. Statesville was selected as the next place of meeting, and the following officers were elected: president, Dr. Robert L. Miller, Waynesboro; vice presidents, Drs. Luther A. De Loach, Glennville, and Antonio J. Waring, Savannah.

**City Discontinues Drug Addict Treatment.**—The City Health Department of Atlanta, which has been treating as many as 500 drug addicts every week for the last three months, has ordered that this treatment be discontinued, as many of the addicts, in spite of their promise that they would enter the hospital at Atlanta, which is maintained by the state for this purpose, would go, after receipt of treatment at Atlanta, to other cities, arouse the sympathy of city officials and obtain similar treatment there.

## ILLINOIS

**Sanitary Personnel Needed.**—Major-Gen. George Bell, Jr., in command of Camp Logan, Houston, Texas, telegraphs to the Secretary of War, August 29, asking that Illinois Field Hospital Nos. 2, 3 and 4, and Illinois Ambulance Companies Nos. 1, 2, 3 and 4 be ordered to Camp Logan.

**Tuberculosis Must Be Reported.**—According to regulations issued by the state department of health, August 30, physicians, health officers, attendants, householders and parents who have knowledge of a known or suspected case of tuberculosis in the state are required to report it to the local health authorities.

**Drugless Practitioners in Illinois.**—An official register of drugless practitioners in Illinois, officially referred to as "Other Practitioners," has been issued by the Illinois State Board of Health. The list contains the names of 1,513 such practitioners who were licensed prior to July 1, 1917, when the licensing of all practitioners of healing was transferred from the state board of health to the new department of registration and education.

### Chicago

**Besley Unit Addition Leaves Chicago.**—Nine physicians of Chicago and forty-seven civilians left for the East, September 2, en route for France. At the East port they will be met by the twenty Red Cross nurses who left Chicago, August 22.—— Lieut. J. Roscoe Harry, M. R. C., U. S. Army, who has been on duty for several months in Chicago, left for France, September 1.

**Gardner Goes to California.**—Dr. George A. Gardner, one of the first of the dispensary physicians connected with the Chicago Tuberculosis Institute, who has been identified with the Stock Yards Dispensary ever since its foundation, and with the first open air school for children, and at Harlowarden camp at Joliet, has accepted a position on the staff of the sanatorium of Dr. Pottenger, at Monrovia, Calif.

## INDIANA

**Infantile Paralysis in East Chicago.**—Seven cases of infantile paralysis, with three deaths, have been reported at East Chicago. The first case developed in July. It is now believed that the disease is under control.

**Personal.**—Drs. John E. McArdle and Edward J. McOscar have been appointed local physicians for the Fort Wayne and Northern Indiana Traction Company.——Dr. Royal H. Gerard, Crawfordsville, has been elected president of the National Fraternal Congress of America.

**State Association Meeting.**—The Indiana State Medical Association will hold its annual meeting in Evansville, under the presidency of Dr. John H. Oliver, Indianapolis, September 26-28. The sessions will be held in the new Coliseum. Dr. Edwin Walker is chairman of the committee of arrangements. The entertainment provided for the association includes an evening trip on the Ohio River, and a motor trip to New Harmony.

## MARYLAND

**To take Charge of Canadian Hospital.**—Dr. Thomas B. Futcher, visiting physician at Johns Hopkins Hospital, and member of the staff of the Medical School, will sail shortly for England, where he will be in charge of the Canadian Military Hospital at Orpington, Kent.

**Ordered to Camp Meade.**—Dr. Arthur M. Shipley, Baltimore, professor of surgery at the University of Maryland, received his commission as chief of the surgical staff of the University of Maryland Base Hospital Unit, has been detached from the unit by order of the War Department, and ordered to report immediately to Camp Meade as chief surgeon and surgical instructor at the camp.

**Mrs. Thayer Dies.**—Mrs. William S. Thayer, wife of Dr. William S. Thayer, Baltimore, died at the home of her niece, Mrs. Samuel Shoemaker Murray, at Pikesville, August 29. Mrs. Thayer was graduated from Johns Hopkins Training School for Nurses in 1892, the first class of the hospital. Sometime later she became superintendent of nurses at the hospital, and was for several years president of the alumnae association. Dr. Thayer is now in Russia.

**War Against Tuberculosis.**—The Maryland Council of Defense has appointed a strong committee for the purpose of making an investigation and report on the tuberculosis situation in this state, the present preventive needs of the state and the extraordinary needs due to the war. This committee was named in response to the appeal placed before the council by Dr. C. Hampson Jones and H. Wirt Steele, executive secretary of the Maryland Association for the Prevention and Relief of Tuberculosis. Prof. Joseph S. Amos, Johns Hopkins University, is chairman of the committee.

## MONTANA

**Decrease in Tuberculosis.**—Superintendent A. F. McDonald of the state sanatorium, Galen, reports that the crusade against tuberculosis in Montana is bearing fruit, and that for the first time since its opening, the sanatorium has vacancies for twenty-five patients.

**Personal.**—Dr. Alfred J. Willits, Anaconda, has been appointed temporary chief of staff of St. Ann's Hospital.—— Dr. Alfred Blumberg, Butte, is said to have filed a suit in the federal court against Dr. Patrick H. McCarthy, health officer of Butte, claiming $5,000 damages on account of alleged slander. The suit is based on a statement said to have been made by Dr. McCarthy at the recent state association meeting to the effect that Dr. Blumberg was a German spy.

## NEW YORK

**Dental Ambulances for New York Troops.**—The preparedness League of American Dentists has been the recipient of a gift of $10,000 from Mrs. William B. Thompson to equip five dental ambulances for the New York state troops. These ambulances will be tendered to the government through the American Red Cross Society. The League of American Dentists proposes to equip a large number of dental ambulances for the expeditionary forces.

**Civil Service Examination for Medical Assistant, District Attorney's Office.**—The civil service commission of the state of New York announces that a competitive examination will be held for the position of medical assistant, district attorney's office, Kings County. Applicants must have been physicians and surgeons for at least ten years, duly licensed to practice medicine in this state. The duties of the office include the examination of the dead body and of all the premises where it is found for the purpose of ascertaining all facts which will aid in elucidating the circumstances surrounding the death. The salary is $3,000. Applications must be filed with the civil service commission, Albany, not later than September 26.

### New York City

**Treatment of Venereal Disease in Dispensaries.**—The board of health has added an amendment to the sanitary code which has as its object the improvement of the standard of service rendered by dispensaries in the treatment of venereal diseases. This amendment includes a number of regulations providing for the keeping of proper records, a follow-up system, the discharge of patients, and requires that such dispensaries be open at least three days a week. These regulations require that in cases of syphilis, salvarsan or one of its analogues be administered in addition to the use of other approved methods of treatment. Microscopic examinations must be made, and in cases of gonorrhea the complement deviation test must be performed. Every dispensary treating these diseases must be provided with facilities for urethroscopic and cystoscopic work, and these facilities must be regularly employed by the phsician in attendance.

**Columbia War Hospital Renamed.**—The Columbia University War Hospital, which was established on Columbia Oval in the Bronx, and was accepted as a war hospital by the government some time ago, has been designated as United States Army General Hospital No. 1. It is to be one of a series of hospitals where serious cases will be brought when treatment requires such time that the men cannot be kept in the field or other hospitals without clogging the machinery of caring for the wounded. The executive committee of the hospitals is composed of Dr. Samuel W. Lambert, dean of the College of Physicians and Surgeons; Dr. John B. Squier, Dr. William H. Bishop, surgeon to the Cumberland Street Hospital of the Department of Charities; Dr. Adrian V. S. Lambert, surgeon to the Presbyterian Hospital; Dr. Francis Carter Wood, director of the laboratories of St. Luke's Hospital; Frederick A. Goetze, treasurer of Columbia University, and Willard V. King, president of the Columbia Trust Company.

**Amendments to Sanitary Code.**—In order to make certain that all persons recognized by their physicians as being infected with a veneral disease shall be instructed as to the

nature of their infection and the measures to be taken to avoid its spread, the Sanitary Code has been adopted to read as follows:

It shall be the duty of every physician to furnish and deliver to every person found by such physician to be affected with syphilis or gonorrhea a circular of instruction and advice, issued or approved by the Department of Health of the City of New York, and to instruct such person as to the precautions to be taken in order to prevent the communication of the disease to others.

No person affected with syphilis or gonorrhea shall, by a negligent act, cause, contribute to, or promote the spread of such disease.

Another new addition to the Sanitary Code provides for the regulation of private laboratories by the department of health. These regulations provide that hereafter no laboratory offering facilities for the diagnosis of communicable disease shall be conducted or maintained in the city of New York without a permit therefor issued by the board of health, or otherwise than in accordance with these regulations. It is required that all specimens be properly numbered, that a record be kept showing the date of receipt of each specimen, the name of the physician submitting the specimen, the result of the test and the name of the person to whom the report was sent. The regulations require that laboratories be adequately equipped and that approved methods be employed. Applications for permits to conduct and maintain such laboratories must be made by those in charge of the laboratory on official blanks furnished by the department of health.

## OHIO

### Cincinnati

**Dr. Reed's Condition Improving.**—The many friends of Dr. Charles A. L. Reed, who suffered a cerebral hemorrhage in Atlantic City, August 23, will be glad to hear that he is now improving.

**Personal.**—Dr. John M. Adams was elected Surgeon-General of the Grand Army of the Republic at the annual encampment in Boston, August 23.——Dr. George A. Fackler is reported to be seriously ill at Christ's Hospital.

**Dr. Ravogli Retires.**—Dr. Augustus Ravogli, chief of staff of the dermatologic department of the Cincinnati General Hospital ever since its reorganization, has retired from the staff after a continuous service of twenty years, and has been succeeded by Meyer L. Heidingsfeld.

## PENNSYLVANIA

**Women Interns in Sanatorium.**—On account of shortage of men due to war conditions, women interns have been attached to the staff of the State Sanatorium, Mont Alto.

**Dysentery Epidemic.**—State health officials are examining into an epidemic of dysentery which has broken out at Amsbry. There have been twenty-five cases of the disease, with two deaths.

**Personal.**—Dr. Wayne L. Shearer, Reading, who was operated on, June 14, at St. Joseph's Hospital, has recovered and resumed practice.——Dr. Adam L. Kotz, Easton, has resigned from the staff of St. Luke's Hospital, South Bethelehem, and has been appointed pathologist for the Easton Hospital.——Dr. John L. Mansuy, Ralston, was attacked by a highwayman near Ralston, August 15, and was shot and wounded in the arm.

### Philadelphia

**Women Commissioned in French Army.**—Drs. Marie K. Formad and Laura Hunt have accepted commissions in the French Army, and will join the unit now being organized by women physicians of New York City.

**Two Ambulances Given University Unit.**—Two additional motor ambulances have been given to the University of Pennsylvania Base Hospital No. 20, one by Mrs. William McLean, in memory of her son who died in June at Fort Oglethorpe, where he was artillery instructor, and one from Mrs. Caleb F. Fox.

**War Hospital Canvass.**—A campaign to raise $25,000 in West Philadelphia for the Jefferson Base Hospital No. 38 was started, August 28, when headquarters were opened in the Chevrolet Motor Car Company. One hundred thousand circulars will be distributed between the above date and September 14, when the final days' drive will be started.

**Personal.**—Dr. James A. Babbitt, physical director at Haverford College, will have charge of the American Friends' Reconstruction Unit, which leaves shortly for France to engage in reconstruction work under the civilian branch of the American Red Cross Association.

## VIRGINIA

**Ambulance Presented to Richmond.**—The Jefferson Club formally presented an ambulance to the Richmond Grays Battalion of the First Virginia Infantry. The presentation address was made by Mr. W. H. Schwarzchild, president of the club. Governor Stewart accepted the gift, and presented it to Major J. Fulmer Bright, commander of the battalion.

**Infantile Paralysis.**—Dr. Ennion G. Williams, Richmond, state health commissioner, in a letter to the Norfolk Board of Health, August 22, stated that there have been twenty-two cases of infantile paralysis in Rockingham County, with seven deaths. He points out the precautionary steps that should be taken, and urges that the cities proceed at once with a vigorous clean-up campaign. The city health board of Staunton, as a precautionary measure, has debarred adults from Rockingham County from visiting Staunton, and, August 18, ordered all churches and moving picture houses closed.

**Base Hospital Staff Announced.**—Dr. Stuart McGuire, Richmond, has announced the official and medical staff of the Medical College Base Hospital Unit No. 45: director, Dr. Stuart McGuire; adjutant, Dr. James H. Smith; registrar, Dr. Greer Baughman; assistant director and chief of surgical staff, Dr. W. Lowndes Peple; surgeons, Drs. Roy C. Fravel, Joseph F. Geisinger, Alvah L. Herring, Carrington Williams, Henry P. Mauck, all of Richmond, and Frank C. Pratt, Fredericksburg; assistant director and chief of medical staff, Dr. J. Garnet Nelson; staff physicians, Drs. William B. Porter, Joseph T. McKinney, Benjamin B. Dutton, Lot, and Junius E. Warinner; assistant director and chief of laboratory, Dr. E. Guy Hopkins; diseases of eye, ear, nose and throat, Dr. William B. Hopkins; neurologist, Dr. Paul V. Anderson; bacteriologist and pathologist, Dr. Charles Philips; roentgenologist, Dr. Frederick M. Hodges, and dentists, Drs. P. J. M. Hughes and J. D. Williams.

## WASHINGTON

**Military Surgeons Organize.**—The Washington Association of Military Surgeons was organized, July 23, at the Field Hospital, American Lake Cantonment, and the following officers were elected: president, Dr. James B. Eagleson, Seattle, and vice presidents, Drs. James R. Yocom, Tacoma; H. Eugene Allen, Seattle, and Samuel E. Lambert, Spokane.

## CANADA

**New Sanatorium Opened.**—The Duke of Devonshire, governor-general of Canada, formally opened a new sanatorium for tuberculosis at Weston, Ont., August 29.

**Model Baby Clinic.**—The Ontario Board of Health held a model baby clinic in connection with its public health exhibit at the Canadian National Exhibition held in Toronto, August 27 to September 8.

**Bruce Report Deferred.**—Sir Robert Borden, Canadian prime minister, has announced in the Canadian house of commons that the Bruce report in reply to that of Colonel Baptie would not be presented to the house at the present time.

**Canadians in Hospital.**—Aug. 28, 1917, there were 26,653 Canadians in hospitals in Canada and the United Kingdom; 8,840 being in Canada, and 17,813 in the United Kingdom. The tuberculosis cases in Canadian convalescent homes numbered 1,115.

**Medical Editor Promoted.**—Capt. Andrew Macphail, editor of the *Canadian Association Journal*, who has been in France almost since the outbreak of the war, but recently attached to the Canadian Medical Headquarters in London, has been promoted to take charge of the Third Army Medical Department, with the rank of major.

**Public Health Association Meeting.**—The sixth annual congress of the Canadian Public Health Association will be held in Ottawa, September 27 and 28, under the presidency of Dr. Joseph D. Page, Quebec. During the same week the Canadian Conference on Charity and Correction and the Canadian Association for the Prevention of Tuberculosis will hold their annual meeting.

**Personal.**—Capt. W. John O. Malloch, M.D., Toronto, who has been with the University of Toronto Base Hospital at

Saloniki, has been promoted to major and has returned to England.——The following Canadian physicians have been mentioned recently in despatches: Lieut.-Col. John A. Amyot, Toronto; Col. Ernest C. Ashton, Brantford, Ont.; Capt. G. C. Bonycastle, Toronto; Lieut.-Col. Perry G. Goldsmith, Toronto; Major Samuel H. McCoy, Toronto; Lieut. H. W. Cheney, Major O. K. Gibson, Capt. Thomas F. Graham, New York; Major W. H. Greene, Capt. H. C. Hall, Major R. M. Harcourt, Capt. J. E. Holmes, Lieut. G. H. Kennedy, Lieut.-Col. George L. Hume, Capt. T. W. Lawson, Capt. O. N. Leslie, Lieut.-Col. G. F. Macfarlane, Lieut.-Col. A. A. Magee, Capt. Frederick R. Mallory, D.D.S., Toronto; Capt. V. C. W. Marshall; Capt. G. V. Morton; Lieut.-Col. Richard Raikes, Capt. L. M. Rathbun, Major J. R. Roaf, Lieut.-Col. Robert D. Rudolf, Toronto; Major B. J. Saunders, Capt. L. P. Sherwood, Capt. H. A. Simmons, Capt. S. C. Snively, Lieut.-Col. Clarence L. Starr, Toronto; Capt. D. D. Wilson and Major Robert E. Wodehouse, Fort William, Ont.

## GENERAL

**Bequests and Donations.**—The following bequests and donations have recently been announced:

The American Red Cross has been given a credit on the Ford factories of $500,000 for automobiles, ambulances, parts, etc., as may be designated by the beneficiary.

Middlebury (Vt.) College, a trust fund of $100,000, to be known as the Henry Freeman Walker Furlough and Emergency Fund, for the benefit of the faculty of the Middlebury College, by the will of Dr. Henry Freeman Walker.

Episcopal Hospital, and Philadelphia Home for Incurables, about $10,000 each, by the will of Penelope Shepard.

**Meeting National Safety Council.**—The sixth annual meeting of the National Safety Council will be held in New York Sept. 10 to 15, 1917. According to the program issued there will be two general sessions, one for presidents and managers and one for young safety engineers. In addition there will be a general round table meeting, sixteen section meetings and the national safety exposition. There are 137 speakers on the program. Each of the sixteen section meetings will relate to some particular industry, and the papers and addresses will refer to some phase of safety in that industry. The health service sectional meeting will take up such subjects as "Industrial Hospitals and Dispensaries;" "First Aid in the Industries. How Much?" "Treatment of Minor Injuries"; "The Need for Visiting Nurses in Industry"; "First Aid and Surgical Work vs. Medical Attention of Employees." General discussions will follow each paper.

## FOREIGN

**Honors for Medical Aviators.**—Major L. Falchi and Capt. F. Rossi are medical officers connected with Italian aviator squadrons, and both are accomplished airmen. Each was recently awarded the silver medal for military gallantry on account of their air achievements and professional devotion. In some of the flights Rossi was commander of the squadron.

**Italian Professors Reaching the Age Limit.**—The seventy-fifth year automatically retires this year from their chairs in the universities Golgi, Novaro and Roster. Golgi and Novaro are both senators of the realm. The former is professor of general pathology at Pavia, and Novaro of surgery at Genoa. Roster is professor of hygiene at Florence.

**Deaths in the Profession Abroad.**—Major-Gen. **T. Rosati,** surgeon-general of the Italian navy, aged 57. He was formerly professor of ear and throat diseases at the University of Naples, and has published much on this specialty and on matters connected with the organization of the profession.—— **J. Veit,** professor of obstetrics and gynecology at the University of Halle, aged 62. At one time he was privat docent at Berlin and later professor at Leyden, and has published numerous works on his specialty.

**Compulsory Surgical Operations on Soldiers.**—The Italian minister of war has refused to permit any operations on soldiers to render them fit for military service unless they consent thereto. Senator Chiesa protests against this ruling, saying that there are at least 100,000 recruits who are rejected on account of hernia who could be restored to clinically normal conditions by an insignificant operation. He says that so many prejudices have been modified by the necessities of war that it seems only fair that those who have some minor defect should have it corrected and thus give the army many thousands of valid recruits. If they do not consent to this voluntarily the prejudice against compelling them against their will should be set aside during the exigencies of warfare.

## PARIS LETTER

PARIS, Aug. 2, 1917.

### The War

INFREQUENT POSTOPERATIVE DRESSINGS AT THE FRONT

Dr. Chevassu recently addressed a communication to the Société de chirurgie de Paris on this subject. Dr. Chevassu has shown that when a fresh war wound has been operated on at the front in a proper manner, the primary adhesions having been broken up, reasonable excisions made and the splinters of the projectile removed as far as possible, the too frequent renewal of dressings is much more likely to prove a cause of new infection than the absence of perfect technic as regards disinfection at the time of operation. Chevassu is also of the opinion that the dressings of men operated on should not be touched until there is positive indication for removing them. The only positive indication is the belief that something wrong or abnormal is taking place under the dressings, that the wound is not developing in the simple manner expected. In that case the dressings should be changed in order to see what is going on. If the temperature and the pulse are watched carefully, one can usually tell whether the wound is progressing normally. It can usually be expected that every man operated on for leg or arm wounds will have some fever inside of twenty-four hours. If the fever persists at the end of thirty-six hours, it merits attention. If it has not subsided at the end of forty-eight hours, the dressings should be removed, especially if it is a question of wounds having their seat in dangerous zones commonly subject to gangrene, such as wounds of the buttock, the thigh, the calf and the arm. In the matter of gas gangrene, the study of the pulse is even more instructive than the changes of temperature. If, beginning with the twenty-fourth hour, the pulse becomes more rapid instead of slowing down, one should see what is going on.

The sudden appearance of sharp pains in the region of the wound, abnormal bleeding, or the soiling of the dressings, may be taken as evident indications that something is wrong. Except for these indications, Chevassu is of opinion that there is every reason to leave the original postoperative dressings in place for a week at least, which effects considerable economy in dressing material and saves the time of the personnel. This is all the more true as regards visceral wounds, for here the mobilization necessitated by the change of dressings is a process fraught with danger. With reference to cerebral wounds, Chevassu has carried the principle of infrequent dressings to its extreme limits, the postoperative dressings in such cases not being removed, if it can possibly be avoided, until about the twenty-fifth day. This practice, combined with the internal use of hexamethylenamin, produced for him last year, during the Battle of the Somme, immediate results which were particularly favorable, since, of seventy-seven patients suffering from cerebral wounds he was able to evacuate fifty-three, or two thirds of the total number, the evacuation usually taking place at the end of a month. But the principle of infrequent dressings is, of course, not applicable unless the wounds are properly treated at the outset. An ample excision of tissue along the path of the projectile without useless waste of substance (but yet opening up the wound sufficiently), which in the case of wounds located near large masses of muscle implies an incision practically equal in length to the depth of the path of the projectile, is the first condition for proper treatment. The extraction of the projectile is an excellent thing to do, but it is not absolutely indispensable, and it is well to know how to dispense with it when one is hard pressed by the vast numbers of wounded and has therefore little time to devote to it. After ample excision throughout the path of the projectile, Chevassu strongly recommends draining the wound by the moderate use of gauze wicks dipped in physiologic sodium chlorid solution. By the aid of this simple and economical fluid such a healthy, vivacious appearance of the wound is secured, and it heals so readily by second intention that Chevassu has never felt the need of using any other methods in the treatment of urgent operative cases at the front.

SUBSTITUTES FOR WHEAT

At a recent meeting of the Académie de médecine, Dr. Maurel, professor of experimental pathology at the Faculté de médecine at Toulouse, presented a communication on the subject of substitutes for wheat now used in the production of bread, and discussed these substitutes from the standpoint of alimentary hygiene. All the different kinds of flour which may be with the sanction of the government mixed with wheat flour have, according to Maurel, practically the same

food value, contain the same amount of carbohydrates, and furnish approximately the same number of calories. No objections on hygienic grounds may be raised against barley, buckwheat, sorghum, millet or beans. The researches undertaken by Maurel lead him to affirm that bread into which the foregoing substitutes enter as constituents will be healthful and, in spite of the great diversity of its components, will possess the same food value as bread made from pure wheat. He fears, however, that these substitutes, taken collectively, may not be sufficient to make up the existing deficit. In this case, it will be easy to remedy the insufficiency by having recourse to the colonial substitutes so called, the use of which is authorized by law, among which rice is entitled to first place.

### A SPECIAL BADGE OF HONOR FOR NURSES

Justin Godart, undersecretary of state for the military medical service, has just issued an administrative order providing for a special badge of honor to be conferred on nurses who have especially distinguished themselves by their devotion and the value and length of their services among the sick and wounded military. This badge of honor consists of two palm branches intercrossed above a small red cross. It is attached by a white clasp and is worn on the left side of the hospital uniform, when this style of dress is used, and on the outside coat above the army nurse badge when the nurse is dressed in civil garb. The nurses who are members of the Sociétés d'assistance attach the badge to the ribbon from which is suspended the emblem of their society. This badge is made in three styles—of bronze, silver or gold. The nurses must have given twelve months of efficient service in order to be adjudged worthy of this badge of honor. The first year's service entitles one to the bronze badge; the second year's service makes one eligible to receive the silver badge, and after three years' service the gold badge may be bestowed.

In the hospital units recommendations are made by the chief surgeons. In the Sociétés d'assistance the chief surgeon makes recommendations either of his own accord or at the instance of the society. He adds critical notes of his own. In due time the recommendations are passed on through a chain of higher authorities, each one giving in a few words the reason for the action he takes in the matter. On the back of the recommendations is given a complete record of the candidate, including any honorable mention he may have received. The badge of honor is bestowed by the undersecretary of state for the military medical service, who sends an official notification to the candidate informing him of the action taken.

## LONDON LETTER

LONDON, Aug. 16, 1917.

### Exhaustion of the Supply of Medical Officers for the Army

The Central Medical War Committee has informed the government that, after a careful survey of the whole of England and Wales, it is of the opinion that no more physicians can be called on to take commissions in the Army Medical Corps without seriously endangering the supply of physicians for the treatment of the civil community, and that further depletion can be effected on the responsibility of the government only after carefully comparing the military with the civil needs. A few more appeals still remain to be heard before the last man considered available by the committee has entered the army, but from September onward it will be quite impossible under present powers and conditions to satisfy the large demands of the Army Medical Department.

In the overseas dominions a similar condition is approaching. In the Australian Commonwealth an appeal is made to physicians to offer their services at once. Young physicians are being sought in preference, but even those of maturer age may be accepted. It will probably be necessary to deplete the junior staffs of the large general hospitals, and senior practitioners who cannot be usefully employed by the country in any other manner are asked to lay aside pride and take on the young man's job during the time of stress. The Department of Defense will send to France every available physician within the next two months.

The position is similar in New Zealand. Hon. G. W. Russell, the minister of public health, recently said: "The medical profession up till the present has done splendidly in accepting the call to the colors, and many physicians have at great sacrifice thrown up their practices and joined the forces, either for work in this country at the camps, and on the medical boards, on the hospital ships, or with the forces in the field. As regards medical service for the civilian population, the position is now becoming very acute. From various parts of New Zealand there is a call for medical service owing to the depletion of those districts of physicians. Up till the present there has not been any necessity to conscript medical men for military service, nor do I think there will be any need to consider the question in the future. Some of the leading hospitals have lately been reduced to the direst straits on account of the shortage of physicians. Recently we had to obtain the services of two medical students from Dunedin in order to carry on the work of the Christchurch Hospital. These facts, and the shortage of physicians in some of the country districts, point to the absolute necessity of the medical services in New Zealand being mobilized and some control exercised throughout the period of the war as to the location of physicians. So far as the large cities are concerned, owing to the large institutions they possess, they will probably be able to win through, although the physicians in practice in the cities are, of course, feeling the pressure of the large amount of additional work entailed on them owing to the absence of so many of their professional brethren. This is not at all the position in other districts. For example, the other day I received word from the Westland Hospital Board that there was only one physician on that part of the coast to cover 300 miles of country."

### Economy in the Prescribing of Glycerin and Sugar

In THE JOURNAL, Sept. 1, 1917, p. 748, attention was drawn to the withdrawal from the British Pharmacopeia of a large number of preparations containing glycerin and sugar in consequence of the necessity to economize in these substances. The government issued a memorandum to physicians at the beginning of the year asking them to economize in the use of these substances; but this has not resulted in a sufficient diminution. The position has become more stringent, and the General Medical Council has now made fresh representations on the subject. It is pointed out that glycerin for medicinal purposes is no longer being manufactured. For such glycerin, therefore, as is required for the treatment of disease, the country must probably depend, until after the end of the war, entirely on existing stocks. These, it is believed, would suffice to provide what is necessary. But if they are drawn on unnecessarily, there is a danger that at a later stage glycerin will not be available for those purposes for which it is really required. Of sugar, on the other hand, a proportion of whatever supply is generally available will continue to be available for medicinal use. Physicians are reminded that, while sugar is of little use medicinally except as an adjuvant or excipient, it is of the greatest value as a food. It therefore ought not to be used for medicines unnecessarily. The following suggestions are made to physicians: As to glycerin: 1. Substances for which glycerin is ordinarily used as a solvent are usually sufficiently soluble for all practical purposes in other mediums. 2. Substitutes for sweetening and preservative purposes are also available, notably chloroform water. 3. Where demulcent action is needed, one of the various mucilaginous bodies, such as mucilage of tragacanth, will usually be found suitable. 4. As a laxative, it is anticipated that physicians will find few cases in which glycerin can be said to be indispensable. 5. For cases in which the physical effects of glycerin on mucous and skin surfaces have led to its use as an ingredient of douches and lotions, similar results can be attained by employing saline, alkaline or other solutions of varying strengths, selected to meet the particular needs of each case. As to sugar: 1. When sweetening is required, agents other than syrup or sugar, such as chloroform water, should be used. 2. Drugs that are ordinarily prescribed in sugar-containing combinations may usually be given without loss of efficiency in some sugar-free form. A preparation made according to the following formula has been found useful as a substitute for either glycerin or syrup: gum tragacanth in powder, 30 grains; chloroform, 40 minims; water to make 10 fluidounces.

### The Control of Venereal Diseases in Tasmania

In THE JOURNAL, Sept. 2, 1916, p. 757, I described the very drastic act passed in Western Australia for the control of venereal disease. The legislatures of Tasmania and of Victoria have followed this example. The act for Tasmania is on very similar lines to that of Western Australia, but differs in details. The treatment of those suffering from venereal diseases is restricted to physicians. Every person suffering from venereal disease must obtain advice forthwith from a physician or must attend at a hospital or at a place prescribed for the treatment of these diseases. Until a certificate of cure has been received, the patient must attend

once in every four weeks. The physician consulted must inform the chief medical officer of the attendance without giving the name or address of the patient. When any patient fails to return for treatment for six weeks, the physician must send to the chief health officer a notice including the name and address of the patient, unless he has been informed by some other physician that the patient is under treatment. The chief health officer is given power to order the patient to obtain treatment from a physician. If the patient does not comply with the request of the chief health officer, a police magistrate may by warrant order the patient to be detained for any period not exceeding four weeks in any prescribed place, so that such clinical, chemical, bacteriologic and other examinations may be carried out to determine whether or not the patient is suffering from venereal disease. If the patient is found to be affected with venereal disease, the governor is given power to order a further period of detention on the report of the minister of health that detention is necessary in the interests of the patient or the public welfare. The right to appeal is given to the patient, and this can be exercised once every three months. Any person undergoing detention who can satisfy the minister that he can obtain and is prepared to undergo suitable private medical treatment, may be released. Every person detained in a place set apart for the care of patients suffering from venereal disease must be examined by two physicians once in every three months. Women have the right to be examined, when practicable, by women physicians. Prisoners under sentence who may be suffering from venereal diseases may be removed to a place set apart for the treatment of these diseases and detained for treatment. The parents and guardians of persons under 16 years of age must obtain treatment for such persons. Imprisonment for twelve months is the penalty for infecting knowingly any person with venereal disease. Hospitals lose their subsidy or portion of it, if they fail to provide for the care and treatment of sufferers from venereal diseases. Power is given to the minister to establish hospitals and dispensaries for the reception and treatment of patients, to arrange for treatment by physicians or at hospitals not receiving aid from the state, and to arrange for clinical, chemical and bacteriologic examinations and investigations free of charge to the patient. Following Western Australia, power is given to the chief health officer to act on the signed statement of any person in which it is asserted that some person is suffering from venereal disease. The chief officer may require the person mentioned in the statement to obtain treatment from a physician. If the order is not obeyed, a magistrate may commit the person to a place of detention for the purpose of an examination to determine the presence or absence of venereal disease. A penalty of $250 is provided for furnishing a wilfully false statement to the chief health officer.

## Marriages

LIEUT. JAY MARION READ, M. R. C., U. S. Army, Presidio of San Francisco, to Mrs. Louise Mae Schussler of San Diego, Calif., August 11.

ASST. SURG. CHARLES H. SAVAGE, U. S. Navy, Jackson, Ala., to Miss Helen S. Woolley of Guntersville, Ala., at Washington, D. C., August 18.

LIEUT. URBAN HENRY REIDT, M. R. C., U. S. Army, Jeannette, Pa., to Miss Kathryn Aloysius Donegan of Irwin, Pa., August 20.

ASST. SURG. GERALD SELBY, U. S. Navy, Baltimore, to Miss Florence Hawes of Bainbridge, Ga., at Baltimore, August 18.

LIEUT. WALTER N. KING, M. R. C., U. S. Army, Corvallis, Ore., to Miss Anna Hagen of Great Falls, Mont., August 7.

SAMUEL WHARTON RANKIN, M.D., Concord, N. C., to Miss Louise Evans Watkins of Flagstaff, Ariz., August 21.

ARTHUR FRANCIS MCGINN, M.D., Portland, Ore., to Miss Helen M. Dimick of Oregon City, Ore., August 17.

RHETT GOODE KORNIKER, M.D., McNary, La., to Miss Elizabeth Gokey of Houston, Texas, August 2.

RICHARD HARRISON PEAKE, M.D., Hot Springs, Ark., to Miss Ethel Nicholson of Norfolk, Va., July 25.

ALBERT NAPOLEON B. LEMOINE, M.D., Nelson, Neb., to Miss Myrle Kohen of Hebron, Neb., June 2.

ORVILLE D. JOHNSON, M.D., Brady, Neb., to Miss Ethel Potter of Gothenburg, Neb., July 19.

## Deaths

**Lieut. George Hiram Matson, Jr.,** M. R. C., U. S. Army, Columbus, Ohio; Ohio Medical University, Columbus, 1905; aged 47; a Fellow of the American Medical Association; professor of materia medica and pharmacy and assistant in therapeutics, and dean of the College of Pharmacy of his alma mater; for eleven years secretary of the Ohio State Medical Board; in 1910, elected secretary-treasurer of the National Confederation of State Examining and Licensing Boards; who was largely instrumental in the creation, in 1912, of the present Federation of State Medical Boards of the United States, was on the committee which drafted its constitution, and was elected its first secretary-treasurer; died suddenly, in the Union Station, Columbus, August 21, from heart disease.

**Samuel Patton Hand, M.D.,** Demopolis, Ala.; Tulane University, New Orleans, 1884; aged 57; a Fellow of the American Medical Association; formerly president of the Marengo County Medical Society; a member of the National Association of Railway Surgeons; local surgeon of the Southern Railway system; founder and president of the Bailey Drug Company, and founder of the Hand and Bailey Infirmary; died at his home, August 13, from angina pectoris.

**J. Morgan Sims, M.D.,** Collinsville, Ill.; University of Louisville, Ky., 1890; aged 48; a Fellow of the American Medical Association; for many years coroner of Madison County, Ill.; medical superintendent of state hospitals for the insane at Lakeland, Ky., and Little Rock, Ark.; while under treatment at the Alton (Ill.) State Hospital, August 16, committed suicide by jumping from the roof of a sun porch.

**John Taylor Harbottle, M.D.,** Newark, Ohio; Starling Medical College, Columbus, 1900; aged 42; a member of the Ohio State Medical Association; for several years assistant physician at the Dayton State Hospital; died in Grace Hospital, Conneaut, Ohio, August 17, as a result of internal injuries received in an automobile accident near East Springfield, Ohio, nine hours before.

**John Strother Pendleton, M.D.,** Scottsville, Va.; Medical College of Virginia, Richmond, 1862; aged 78; surgeon in the Confederate service during the Civil War; surgeon at the Virginia State Penitentiary Farm for several years; for twenty-five years a member of the board of directors of his alma mater; died recently at the home of his daughter in Richmond.

**William H. Van den Burg, M.D.,** New York; New York Homeopathic Medical College, 1887; aged 55; a Fellow of the American Medical Association; professor of theory and practice of medicine in his alma mater; chief of staff of the Hahnemann Hospital, New York; died in that institution, August 22, from pneumonia, following an operation performed five days before.

**Benjamin Archer Waddington, M.D.,** Salem, N. J.; University of Pennesylvania, Philadelphia, 1865; aged 75; formerly a Fellow of the American Medical Association; a member and once president of the Tri-County Medical Society, and Salem County Medical Society; one of the best known practitioners of South Jersey; died at his home, August 23.

**John T. Cooper, M.D.,** Muskegon, Mich.; Grand Rapids (Mich.) Medical College, 1902; aged 55; a member of the Michigan State Medical Society; county physician of Muskegon County from 1912 to 1915; a member of the obstetric staff and chief of the hydrotherapeutic department of the Hackley Hospital; died at his home, August 19.

**Joseph K. MacConnell, M.D.,** Cranford, N. J.; Starling Medical College, Columbus, Ohio, 1868; aged 80; formerly a member of the Medical Society of the State of New Jersey; and president of the Union County Medical Society; for many years town physician of Cranford; died in St. Elizabeth's Hospital, Elizabeth, N. J., August 15.

**Bernard Palissy Evans, M.D.,** Quitman, Miss.; Tulane University, New Orleans, 1910; aged 40; a Fellow of the American Medical Association, and president of the Clarke-Wayne Counties Medical Society; a member of the Association of Southern Railway Surgeons; died at his home, August 19, from aortic insufficiency.

**Charles Henry Thompson, M.D.,** Novato, Calif.; Homeopathic Medical College of Pennsylvania, Philadelphia, 1867; aged 75; formerly a member of the Medical Society of the State of California; a director of the Santa Rosa National

and Union Trust banks; died at his home, August 14, from heart disease.

**Francis Frederick Markey, M.D.,** Seattle; College of Physicians and Surgeons, Chicago, 1899; aged 39; a Fellow of the American Medical Association; president of the Seattle Anatomical Club; died in the Providence Hospital, Seattle, August 17, from septicemia consequent on an operation wound.

**Abner J. P. Julian, M.D.,** Lake City, Fla.; University of Maryland, Baltimore, 1883; aged 58; formerly a Fellow of the American Medical Association; a member of the Florida Medical Association; at one time a member of the state legislature of Florida; died at his home, August 14.

**Lieut. Nehemiah Fay Tilton,** M. R. C., U. S. Army, Marion, Ohio; Ohio Medical University, Columbus, 1901; aged 44; a member of the Ohio State Medical Association, and president of the Marion County Medical Society; died at his home, August 22, from nephritis.

**Douglas Gray MacRobbie, M.D.,** Hamilton, Ont., Trinity Medical College, Toronto, Ont., 1899; aged 43; was found dead from skull fracture, August 20, in the office of an industrial plant at Hamilton. He is believed to have been beaten to death.

**George Theodore Mundorff, M.D.,** New York; New York University, New York, 1895; aged 45; formerly a Fellow of the American Medical Association; a member of the staff of St. Francis Hospital, New York; died at his home, August 21.

**Samuel Meyer, M.D.,** Louisville, Ky.; University of Louisville, Ky., 1891; aged 48; also a druggist; for several years a member of the Louisville school board; died in the Jewish Hospital, Louisville, August 17, from cerebral hemorrhage.

**William Lowndes Wells, M.D.,** New Rochelle, N. Y.; College of Physicians and Surgeons in the City of New York, 1852; aged 88; surgeon of U. S. Volunteers during the Civil War; died at his home, August 17, from pneumonia.

**Ernest J. Duncan, M.D.,** Olive Branch, Ill.; St. Louis College of Physicians and Surgeons, 1902; aged 38; was shot and killed at Olive Branch, August 25, by a lad who said that he and his sister had been mistreated by Dr. Duncan.

**Thomas Crawford Parks, M.D.,** Akron, Ohio; Starling Medical College, Columbus, Ohio, 1883; aged 53; formerly a Fellow of the American Medical Association; died in the Massillon (Ohio) State Hospital, August 23.

**Mary Starr Tudor, M.D.,** South Windsor, Conn.; Woman's Medical College of Pennsylvania, Philadelphia; 1892; aged 76; formerly a member of the Connecticut State Medical Society; died at her home, August 24.

**Henry William Cronin, M.D.,** Worcester, Mass.; College of Physicians and Surgeons, Baltimore, 1893; aged 54; a member of the Massachusetts Medical Society; died at his home, August 20.

**Joseph B. Walter, M.D.,** Solebury, Pa.; University of Pennsylvania, Philadelphia, 1868; aged 76; a member of the Medical Society of the State of Pennsylvania; died at his home, about August 18.

**Robert McDowell Reid, M.D.,** Gastonia, N. C.; New York University, New York, 1890; aged 52; a Fellow of the American Medical Association; died at his home, August 14, from angina pectoris.

**William Rowan Barron, M.D.,** Marion, Ala.; Medical College of Virginia, Richmond, 1863; aged 83; a member of the Medical Association of the State of Alabama; died at his home, July 22.

**John E. Connell, M.D.,** Marshall, Mo.; St. Louis College of Physicians and Surgeons, 1889; aged 52; a member of the Missouri State Medical Association; died at his home, August 18.

**James B. Summer, M.D.,** Bloomington, Neb.; University of Vermont, Burlington, 1879; aged 70; formerly a member of the Nebraska State Medical Association; died at his home, June 27.

**Fred H. Hart, M.D.,** Louisville, Ky.; University of Louisville, Ky., 1897; aged 55; died in the Louisville City Hospital, August 11, from uremia.

**Isaac Meyer Birkey, M.D.,** Newportville, Pa.; University of Pennsylvania, Philadelphia, 1865; aged 74; died at his home, August 16.

**Ralph B. Griswold, M.D.,** Banksville, N. Y.; Eclectic Medical Institute, Cincinnati, 1857; aged 82; died at his home, August 17.

**Robert H. Carter, M.D.,** Lynnville, Tenn.; University of Louisville, Ky., 1874; aged 70; died at his home, July 29.

# *The Propaganda for Reform*

IN THIS DEPARTMENT APPEAR REPORTS OF THE COUNCIL ON PHARMACY AND CHEMISTRY AND OF THE ASSOCIATION LABORATORY, TOGETHER WITH OTHER MATTER TENDING TO AID INTELLIGENT PRESCRIBING AND TO OPPOSE MEDICAL FRAUD ON THE PUBLIC AND ON THE PROFESSION

## FERRIVINE, INTRAMINE AND COLLOSOL IODINE

### Report of the Council on Pharmacy and Chemistry

E. Fougera & Co., Inc., New York, acting as agent for The British Drug Houses, Ltd., London, advertise "Ferrivine," "Intramine" and "Collosol Iodine" to the medical profession. A circular entitled "Ferrivine, The New Anti-Syphilitic Remedy" begins:

"FERRIVINE is the name given to ferric tri-para-amino-benzene sulphonate. This iron compound was first prepared by Mr. J. E. R. McDonagh, F.R.C.S., by whom it has been both biologically and clinically tested. It is slightly soluble in water, the solution having an acid reaction.

"INDICATIONS

"According to Mr. J. E. R. McDonagh's researches, the phases of the *Leucocytozoon syphilidis* are killed by the lipoid-globulin molecules of the serum, which possess a stereo-chemical molecular configuration homologous to those of the lipoid-globulin molecules of the parasite. The process is one of absorption, a chemico-physical reaction which is in part dependent upon the supply of active oxygen. Active oxygen is formed directly by oxidation processes and the peroxide necessary for its formation directly by reducing processes. Oxidation is increased by metals and reduction by non-metals. The non-metal which acts in the body as the normal reducing agent is sulphur, hence the discovery of Intramine (see separate pamphlet). The metal which acts in the body as the normal oxidising agent, is iron, hence the discovery of Ferrivine."

A circular, "Intramine, a New Non-Toxic Compound for the Treatment of Protozoal and Chronic Bacterial Diseases," expounds Mr. McDonagh's ideas of the treatment of syphilis with Ferrivine and Intramine by means of the oxidising action of Ferrivine and the reducing action of Intramine and asserts:

"As the ultimate administration of oxidising and reducing agents will benefit almost any infection, it may be said that Intramine is indicated in all protozoal diseases, and in all chronic bacterial diseases, especially in tuberculosis, presumably in leprosy and possibly in malignant disease [cancer?]. To the administration of Intramine there are no contra-indications."

We are also told that:

"Intramine is useful injected into the urethra . . . in cases of chronic urethritis and perifolliculitis . . . invaluable as a local application to chronic ulcers . . ."

The Intramine circular includes a "Scheme of Treatment for Syphilis" which advises, in addition to Intramine, Ferrivine or salvarsan, mercury and iodids, the use of another proprietary called "Collosol Iodine." An inquiry addressed to Fougera & Co. in regard to the character and composition of this preparation, brought the reply that the firm had no knowledge of its identity.

This "scheme of treatment" is objectionable in that it advises the "stock" treatment of a disease which demands individualization and further in that whatever beneficial effects may result from the use of mercury and iodid is likely to be ascribed to the preparations "Intramine," "Ferrivine" and "Collosol Iodine."

The advertising for Ferrivine and Intramine sent out by Fougera & Co. contains no experimental or clinical data on which an estimate of their value may be based. Apparently in England, where these products were originated, little has been published regarding them.

There is, however, one report which may be accepted as a carefully controlled clinical trial. In the *Lancet* (June 17, 1916, p. 1214) L. W. Harrison, D.S.O., M.B., Ch.B.Glasg., and C. H. Mills, M.R.C.S., L.R.C.P.Lond., report on "The Effect of Ferrivine and Intramine on Syphilis." After briefly reviewing the theories which form the basis of McDonagh's proposed treatment of syphilis with his discoveries "Ferrivine" and "Intramine" the authors point out:

". . . that Mr. McDonagh's biological discoveries . . . have not been publicly confirmed by any biologist of standing . . ."

While:

". . . eminent chemists have confessed themselves unable to understand his chemistry."

The authors explain:

"Recognizing that this might prejudice our practical tests of Intramine and Ferrivine, we have taken particular care to guard against their influence, cross-checking our observations and submitting them to others for confirmation or otherwise."

Harrison and Mills chose for a test three ordinary cases of secondary syphilis, cases with well marked lesions, the clinical progress of which could easily be watched and from which it was easy to obtain specimens for microscopic examination. After a detailed account of the three cases—which records grave conditions resulting from the treatment and which shows the inefficiency of the drugs—they write:

"From the above account it will be seen that the local and general reactions which follow the injection of these preparations are by no means pleasant. In the case of Intramine the pain is undiluted torture, and lasts so for two or three days. One of us had previously treated four cases with Intramine and the same local reaction occurred in these. In two of them abscesses have burst outwardly, one of which is still discharging necrotic débris, ten weeks after the injection, and will take many more weeks to close. In those cases where no abscess has yet burst it is easy to feel by the gap in the muscles that considerable necrosis has occurred. None of these effects can be ascribed to sepsis, as most rigid aseptic precautions were taken. Further, particular care was taken to make the injections strictly intramuscular. The constitutional symptoms which follow immediately upon the injection of Ferrivine are distinctly alarming, and such as would cause one to hesitate before injecting this remedy into any but robust patients."

Harrison and Mills estimate the therapeutic effects of these drugs thus:

"1. That Ferrivine entirely failed to cause *S. pallida* to disappear from the lesions of three well-marked cases of secondary syphilis.

"2. After the failure of Ferrivine to cause the disappearance of *Spirochæta pallida* from a mucous patch a single dose of 0.3 gm. salvarsan effected this in 18 hours, and the patch, which had hitherto been uninfluenced, had healed within 48 hours.

"3. Clinically we were unable to detect any influence of either or both these compounds on syphilitic lesions, although each of them was of the variety which heals in a week or ten days under salvarsan treatment.

"4. Further syphilitic lesions appeared immediately after the treatment in one of the two cases treated with both Ferrivine and Intramine. A mucous patch appeared on one tonsil as well as further syphilitic papules from which spirochætes were obtained. The other case developed nephritis, with albumin and epithelial casts; which was not present prior to the injections."

While from these cases the obvious conclusion was drawn that Intramine and Ferrivine "have no specific effect on early syphilis," these authors subsequently treated a case of tertiary syphilis with the drugs. An Intramine injection caused pain for several days but did not stop the progress of the disease. Ferrivine was then administered "not without a feeling of grave responsibility" in view of their previous experiences. They state that "the reaction which resulted in this instance was the most severe" they ever experienced after an intravenous injection of any of the antisyphilitic remedies with which they had previously worked. It is stated that "for a period of some minutes there was grave doubt as to the patient's survival." After resuscitation the patient passed a disturbed night, and rigors which ensued lasted until the following afternoon. The authors report that in this case also no clinical improvement occurred and that the Intramine-Ferrivine treatment was replaced by a course consisting of salvarsan, potassium iodid and mercurial inunction.

Ferrivine, Intramine and Collosol Iodine were declared inadmissible to New and Nonofficial Remedies.

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**The General Practitioner's Duty.**—Preparedness for health in any state or community requires for the prevention of communicable disease, accuracy in early diagnosis by the family practitioner and such means and knowledge as to care and treatment as will shorten the period of communicability to the minimum and limit the contact between the sick person and the rest of the community to those who are insusceptible or to places where the conditions of residence and supervision will prevent exposure.—Haven Emerson, M.D., "Preparedness for Health."

## *Correspondence*

### "PATRIOTISM RAMPANT"

*To the Editor:*—Referring to Dr. Burr's letter in THE JOURNAL, Sept. 1, 1917, p. 751, it is true that Eucken declared that German Kultur was necessary to the spiritual preservation of mankind. But he did not say that the English language should be barred from Germany.

The Germans are still reading English literature, and are very frequently presenting Shakesperian plays, even more often than we are. And even England itself has not barred the German language. In the "Prospectus of University Courses in the Manchester School of Technology," Manchester, England, session of 1917-1918, you will find that all courses, namely, mechanical engineering, electrical engineering, municipal and sanitary engineering, and applied and textile industries, provide for the teaching of German. German textbooks are recommended for the use of the students, and no other foreign language is mentioned. Must we out-English the English?

One other question. If we discard the German language, should we not be consistent and refuse to make use of any of the German discoveries? For instance, would it not be unpatriotic to perform the Wassermann test, to administer salvarsan or to look for the gonococcus and the *Spirochæta pallida?* For as you know, they all come from German sources.

WILLIAM J. ROBINSON, M.D., New York.

*To the Editor:*—Once more, please, something in answer to "Patriotism Rampant." Should we discard the German language we would have to dismiss about half of the English as well. Have we ever stopped to think how much alike these two languages are? There are many like words in the two languages modified only in form; their common origin can be recognized readily. This goes to show that we are of common stock belonging to the Low German race, from which came the Angles and Saxons. "Some historians, as Prof. Henry Morley, regard the distinction between Saxon and Angle as a mere accidental difference of name; the people themselves employing the name of Angles, while Saxon was a foreign designation by the Romans and Celts." The authority Bede says that the Angles were one of three tribes that passed over from the continent in the fifth and sixth centuries into England and formed the dominant element in its subsequent population. During the reign of William the Conqueror, a host of words of Latin-French or English form crept into the English, making the language a hodgepodge. It is hard to tell just how they ever got there, yet there also appear in the English language a number of Greek words, thus showing the language to be a veritable mongrel. However, be it as it may, the two peoples, the German and the English, have so much in common that they should be shaking hands instead of nursing discord and hatred.

ROBERT PETER, M.D., Chicago.

*To the Editor:*—If it was the intention to discredit or make ridiculous the subject matter of my letter in THE JOURNAL, September 1, by reprinting the caption "Patriotism Rampant," the object might have been better attained by following the lead of your lay contemporary, the Detroit *Abend Post* in employing "Hysterische Patriotismus."

I submit that it is necessary to put a crimp in the sort of propaganda detailed in my letter to the Detroit *Saturday Night*, which I enclose, and if any better method is known to this end than minimizing the importance of study in this country of a very much overestimated foreign language, it is somebody's duty to suggest it. The Teutonic plan of sneering at anything which bears the remotest resemblance to American patriotism is becoming more and more unpopular, and what is denominated in German printed papers in this country the "nativist" press, whether lay or medical, will soon discover it.

There are three ways of graduated effectiveness in dealing with a bully—cow, cripple or kill—and if a mischievous agi-

tator can be at least temporarily made aphasic, it may save a situation.

Two German papers which I read and from which the quotations in the Detroit *Saturday Night* were made are now squealing about "Hetze." Let them cease their own baiting, which they will do when they deem it expedient, but never before.

To discourage for the present at least the teaching of German in this country would be equivalent to extracting poison fangs from the copperhead. Tearing tributes to the kaiser from spelling books is not enough. In the language of a recent writer, it is more important to know who is responsible for their introduction there.

I have no distinct recollection of the resolution to which you referred in THE JOURNAL comment of August 18, but hereby proclaim aloud my approval of it, provided its terms are as you outlined.

C. B. BURR, M.D., Flint, Mich.
Member Michigan State Board of Registration in Medicine.

## THE ROLL OF HONOR

*To the Editor:*—Kindly allow just a word regarding Capt. H. H. Roberts' misconception of "sacrifice" when in a letter published in THE JOURNAL (Aug. 18, 1917, p. 583) he refers especially to those physicians who, in accepting military commissions, have relinquished practices that yielded from "thousands of dollars" to $100,000 annually. I trust that no one would have the temerity to assert that men in that financial class are not sacrificing heavily when they go to the front; but I do wish to emphasize that while their absolute monetary loss is in six figures, the real sacrifice involved is far smaller than that offered by men of meager earnings.

I ask, Which man gives more—he who has the reserve income that goes with a $100,000 practice, whose family will suffer no financial deprivation, whose life is heavily insured, whose repute is such that he can easily revive his practice after a long absence, or he who has had to live on a meager income of four figures, whose hard savings yield a negligible income, whose life insurance is small, whose practice evaporates during a six months' absence, whose family must suffer deprivation when his income is reduced, and who must again painfully climb the ladder from the lowest rung on his return?

I repeat that both are to be greatly admired for their patriotism and sacrifice. But let no man believe that the rich physicians are sacrificing more than, or perhaps as much as are the poorer ones.

EDWARD VON ADELUNG, M.D., Oakland, Calif.

## END MONOPOLY ON SALVARSAN

*To the Editor:*—To the communication of Dr. S. Pollitzer (THE JOURNAL, July 28, 1917, p. 305) concerning the price of salvarsan in this country, I wish to add one thing, and I will ask a few questions.

In Athens, Greece, in 1913, I used to buy either salvarsan or neosalvarsan, the full dose, 0.9 gm., for 8 drachmas, or $1.55, and the minimum dose, 0.45 gm., for 4.50 drachmas, or $0.89, and the same drugs were sold to the hospitals for 20 per cent. less.

What then, makes the price of salvarsan in the United States so high? Does it pay duty? How much does the same thing cost in Germany? What is the price of arsenobenzol in comparison of that of salvarsan if "the chemicals that enter cost normally only a few dollars per pound"? Why pay $3 per 0.3 gm. of galyl, another arsenical, in this country?

G. KATSAINOS, M.D., Boston.

**Typhoid in 1898.**—In our war with Spain we had 20,738 cases, with 1,580 deaths, among 108,000 men, all occurring within three and a half months; one man in every six had the disease, while this proportion was increased to one in five among those regiments which never left the United States.—Keefer, Military Hygiene.

# *Queries and Minor Notes*

ANONYMOUS COMMUNICATIONS and queries on postal cards will not be noticed. Every letter must contain the writer's name and address, but these will be omitted, on request.

## LITERATURE ON DIET AND NUTRITION

*To the Editor:* Please supply me with information or advice as to the best work, that is, the most accurate work, dealing with nutrition and clinical dietetics, as the workers vary in their opinions concerning the food values and estimated calories to be found in the various kinds of foods.

The great number of such workers makes it difficult to select the best works that can be accepted as giving one the most accurate knowledge as to the work that has been carried out.

I feel that you can advise me without being influenced by any works which may have been put on the market by any of the numerous publishing companies.

THOMAS H. POTTER, M.D., Detroit.

ANSWER.—It is always embarrassing to attempt to select a best treatise on most subjects because many good books have individual features of merit that specially recommend them. The problem is somewhat like the one involved in the request to name the best breed of dairy cattle. That depends!

Our correspondent will find a thoroughly up-to-date presentation of the subject of nutrition both in health and in disease in the newest edition of Graham Lusk's "The Elements of the Science of Nutrition," Philadelphia, W. B. Saunders Company, 1917. It is in many respects one of the best general reviews of the scientific substratum on which present-day knowledge of the subject rests. Some of the debated aspects of metabolism are attractively presented by Otto von Fürth's "Problems of Physiological and Pathological Chemistry," translated by A. J. Smith, Philadelphia, J. B. Lippincott Company. Individual features are treated more exhaustively in a series of "Monographs on Biochemistry," published by Longmans, Green & Co., New York. This includes detailed expositions of such topics as the carbohydrates, the fats, the proteins, the nucleic acids, etc., and their behavior in the body. The volume by F. P. Underhill, "Physiology of the Amino-Acids," New Haven, Yale University Press, will introduce the reader to the significance of one of the most important fields in the science of nutrition. Various excellent treatises, such as Joslin's "Treatment of Diabetes" or H. G. Wells' "Chemical Pathology," deal with the intricacies of metabolism in disease. Among numerous books on dietetics, attention may be called to Friedenwald and Ruhräh's "Diet in Health and Disease," Philadelphia, and W. G. Thompson's "Practical Dietetics." In a category by itself is the excellent book by Mrs. M. S. Rose, "Feeding the Family," New York, Macmillan Company, which combines the latest contributions of physiology with practical directions for the dietary in a singularly effective and readable manner. Here, too, will be found a large collection of selected data on the calory values of foods, as well as rational guidance in the selection of foods for individuals of all ages. As a compilation of analyses, Bulletin 28, Office of Experiment Stations, U. S. Department of Agriculture, Washington, D. C. (for sale by Superintendent of Documents, Government Printing Office, Washington, D. C., price 10 cents) on "The Chemical Composition of American Food Materials" is *facile princeps*, and should be in the hands of every progressive physician. We also urge those interested to obtain a copy (without charge) of Farmer's Bulletin 808, U. S. Department of Agriculture, Washington, D. C., on "How to Select Foods, I, What the Body Needs." This gives a simple method of selecting and combining food materials to provide an adequate, attractive and economical diet. It also contains a long list of the excellent publications of that department of interest in connection with the subject. The newer aspects of nutrition study have been reviewed in THE JOURNAL in recent years by L. B. Mendel, "Nutrition and Growth" (May 8, 1915, p. 1539), and by E. V. McCollum, "The Supplementary Dietary Relationships Among Our Natural Foodstuffs" (May 12, 1917, p. 1379). To these may be added Graham Lusk's "The Fundamental Basis of Nutrition," New Haven, Yale University Press, 1914, and F. C. Gephart and Graham Lusk's "Analyses of Ready-to-Serve Foods," Chicago, The American Medical Association Press, 1915.

# Medical Education and State Boards of Registration

## COMING EXAMINATIONS

ARIZONA: Phoenix, Oct. 2-3. Sec., Dr. John Wix Thomas, 306 Goodrich Bldg., Phoenix.

CALIFORNIA: Los Angeles, Oct. 9-13. Secretary, Dr. Charles B. Pinkham, State Capitol, Sacramento.

COLORADO: Denver, Oct. 2. Sec., Dr. David A. Strickler, 612 Empire Bldg., Denver.

DISTRICT OF COLUMBIA: Washington, Oct. 9-11. Sec., Dr. Edgar P. Copeland, The Rockingham, Washington, D. C.

GEORGIA: Atlanta, Oct. 9-11. Sec., Dr. C. T. Nolan, Marietta, Ga.

HAWAII: Honolulu, Sept. 10-13. Chairman, R. W. Benz, 1141 Alakea St., Honolulu.

IDAHO: Pocatello, Oct. 2. Sec., Dr. Charles A. Dettman, Burke.

ILLINOIS: Chicago, Oct. 9-11. Superintendent of Registration, Mr. F. C. Dodds, Springfield.

IOWA: Des Moines, Oct. 9-11. Sec., Dr. G. H. Sumner, State House, Des Moines.

MASSACHUSETTS: Boston, Sept. 11-13. Sec., Dr. Walter P. Bowers, Room 501, No. 1 Beacon St., Boston.

MICHIGAN: Lansing, Oct. 9-11. Sec., Dr. B. D. Harison, 504 Washington Arcade, Detroit.

MINNESOTA: Minneapolis, Oct. 2-5. Sec., Dr. Thomas S. McDavitt, Lowry Bldg., St. Paul.

MONTANA: Helena, Oct. 2. Sec., Dr. William C. Riddell, Power Bldg., Helena.

NATIONAL BOARD OF MEDICAL EXAMINERS: Chicago, Oct. 10-18. Sec., Dr. J. S. Rodman, 2106 Walnut St., Philadelphia.

NEW JERSEY: Trenton, Oct. 16-17. Sec., Dr. Alexander MacAlister, 438 E. State St., Trenton.

NEW MEXICO: Santa Fe, Oct. 8. Sec., Dr. R. K. McClanahan, East Las Vegas.

NEW YORK: Albany, Buffalo, New York City and Syracuse, Oct. 2-5. Chief, Examinations Division, Harlan S. Horner, State Education Bldg., Albany.

OKLAHOMA: Oklahoma City, Oct. 9-10. Sec., Dr. Ralph V. Smith, 502 Daniel Bldg., Tulsa.

PORTO RICO: San Juan, Oct. 2. Sec., Dr. M. Quevedo Baez, San Juan.

RHODE ISLAND: Providence, Oct. 4-5. Sec., Dr. Byron O. Richards, State House, Providence.

UTAH: Salt Lake City, Oct. 1-2. Sec., Dr. G. F. Harding, Templeton Bldg., Salt Lake City.

### Louisiana June Examination

Dr. E. W. Mahler, secretary pro-tem of the Louisiana State Board of Medical Examiners, reports the written examination held at New Orleans, June 7-9, 1917. The examination covered 11 subjects and included 100 questions. The percentage required to pass was 75. Of the 41 candidates examined, 34 passed and 7 failed. Two candidates were licensed through reciprocity. The following colleges were represented:

| College | Year Grad. | Per Cent. |
|---|---|---|
| **PASSED** | | |
| Chicago College of Medicine and Surgery | (1917) | 87 |
| Tulane University of Louisiana | (1916) 88.9; (1917) 79.1, 80.6, 84.7, 85.2, 85.3, 86, 86.1, 86.7, 87.2, 87.4, 87.4, 87.9, 87.9, 88, 88, 88.6, 88.8, 89, 89.6, 89.6, 89.7, 90.4, 91.4, 91.4, 92.9, 93.7, 95.4. | |
| University Medical College of Kansas City | (1896) | 86.2 |
| Meharry Medical College | (1916) 76.3; (1917) | 77.3 |
| Memphis Hospital Medical College | (1912) | 79 |
| Vanderbilt University | (1914) | 89.8 |
| **FAILED** | | |
| Chicago College of Medicine and Surgery | (1917) | 69.8 |
| Maryland Medical College | (1910) | 32.9 |
| Meharry Medical College | (1916) 63.7; (1917) | 61 |
| Memphis Hospital Medical College | (1911) 71.2; (1912) | 55.6 |
| University of Nicaragua | (1909) | 62.2 |

| College | Year Grad. | Reciprocity with |
|---|---|---|
| **LICENSED THROUGH RECIPROCITY** | | |
| College of Physicians and Surgeons, Chicago | (1907) | Illinois |
| Tulane University of Louisiana | (1915) | Mississippi |

### Florida June Examination

Dr. E. W. Warren, secretary of the Regular Board of Medical Examiners of the State of Florida, reports the written examination held at Palatka, June 19-20, 1917. The examination covered 7 subjects, and included 70 questions. The percentage required to pass was 75. Of the 30 candidates examined, 28 passed, and 2 failed. The following colleges were represented:

| College | Year Grad. | Per Cent. |
|---|---|---|
| **PASSED** | | |
| Birmingham Medical College | (1915) | 75 |
| University of Alabama | (1914) | 77.6 |
| Atlanta Medical College | (1914) 75.3; (1916) 90.4; (1917) | 79.4 |
| Southern Medical College | (1897) | 69.1* |
| Rush Medical College | (1906) | 88 |
| Kentucky School of Medicine | (1891) 62*; (1892) | 74.6* |
| Louisville Medical College | (1875) | 62* |
| Tulane University of Louisiana | (1910) 78; (1917) | 83.1 |
| Johns Hopkins University | (1909) | 85.7 |
| University of Maryland | (1884) 58*; (1916) 78.1, 86.1 | |
| University Medical College of Kansas City | (1901) | 77.3 |
| University of the City of New York | (1880) | 74.3* |
| Medical College of Ohio | (1900) | 73.3* |
| University of Cincinnati | (1911) | 91.3 |
| Jefferson Medical College of Philadelphia | (1901) | 83.4 |
| University of Pennsylvania | (1894) | 84.5 |
| Med. Col. of the State of South Carolina | (1915) 85; (1917) | 90.3 |
| Lincoln Memorial University | (1916) | 82.4 |
| Meharry Medical College | (1917) 76, | 84.3 |
| Vanderbilt University | (1892) | 66* |
| **FAILED** | | |
| Bennett Medical College | (1915) | 65.4 |
| Louisville Medical College | (1891) | 49.7 |

* Credit allowed for years of practice.

### Oklahoma January Examination

Dr. Ralph V. Smith, secretary of the Oklahoma State Board of Medical Examiners, reports the oral and written examination held at Oklahoma City, Jan. 9-10, 1917. The examination covered 11 subjects and included 100 questions. The percentage required to pass was 70. Six candidates were examined, of whom 4 passed, and 2 failed, including 1 osteopath. Twenty-six candidates were licensed through reciprocity and 5* were granted reregistration licenses. The following colleges were represented:

| College | Year Grad. | Per Cent. |
|---|---|---|
| **PASSED** | | |
| Rush Medical College | (1916) | 88 |
| Harvard University | (1916) | 86 |
| University of Cincinnati | (1912) | 82 |
| University of Pennsylvania | (1908) | 81 |
| **FAILED** | | |
| Memphis Hospital Medical College | (1913) | 64 |

| College | Year Grad. | Reciprocity with |
|---|---|---|
| **LICENSED THROUGH RECIPROCITY** | | |
| University of Arkansas | (1912) | Arkansas |
| Hahnemann Med. Coll. and Hospital of Chicago | (1900) | Nebraska |
| Rush Medical College | (1893) | Kansas |
| University of Louisville | (1907) | Mississippi |
| Tulane University of Louisiana | (1888) (1891) (1892) | Mississippi |
| Baltimore Medical College | (1896) | California |
| College of Physicians and Surgeons, Baltimore | (1886) | W. Virginia |
| American Medical College | (1909) | Arkansas |
| St. Louis University | (1906) (1912) (1914) | Missouri |
| University Medical College of Kansas City | (1911) | Missouri |
| Jefferson Medical College of Philadelphia | (1904) | Mississippi |
| Chattanooga Medical College | (1893) | Georgia |
| Memphis Hospital Medical College | (1888) (1901) (1905) | Mississippi |
| University of Nashville | (1901) (1966) (1908) | Mississippi |
| University of the South | (1899) | Mississippi |
| University of Tennessee | (1913) | Mississippi |
| Vanderbilt University | (1901) | Mississippi |
| Dallas Medical College | (1904)† | Texas |

* Includes one whose name is not on the official list of the institution named—the Louisville Hospital Medical College.

† The name of this candidate does not appear on the official list of the graduates of this school for the year given.

# Book Notices

MENTAL ADJUSTMENTS. By Frederic Lyman Wells. Cloth. Price, $2.50 net. Pp. 331, New York: D. Appleton & Co., 1917.

In his preface, the author says, "To the individual, better self-understanding means better self-control, and wiser ordering of one's actions along the normal paths of happiness." He might have added that better self-understanding means better understanding of others; and understanding others is no inconsiderable part of the task of the physician. The book is a delightful presentation of some of the more recently acquired knowledge of ourselves. As Professor Jastrow says in the introduction, "Life remains a struggle and a conflict," but the original simplicity has long since departed. It is now intricately complex. Modern psychology has contributed much to our knowledge of the psychic and especially the affective factor in this complex struggle. The book deals with this factor, and because of its quality is a real contribution to the psychology of our daily life. In no sense is it a medical textbook, but any physician who is not blind to the fact that there are patients as well as diseases will read it with profit. If his work is with the nervous and unbalanced he should be quite familiar with much of it. But is he?

The subjects of the various chapters, mental adaptation, use and waste in thought and conduct, symbolic association, the continuity of emotion, types of dissociation, mechanisms in dissociated ideas, and experimental approaches and balancing factors, indicate the ground covered. Judging by this book, the attitude of the author may be said to be that of a modified freudian. The modification will be much to the taste of some readers. Whether a pill is coated with sugar or with asafetida may have nothing to do with its wholesomeness but much with its acceptability From many of the freudian concepts the author (consciously or unconsciously) removes the coating of sexuality so distasteful for many (perhaps because sexuality is confused with sensuality), and substitutes the palatable one of natural history. To some ears "love-life" has a much nicer sound than "libido." Another illustration may be more apt. To go straight to the top of a steep hill is sure to be laborious; for some travelers impossible. But if one is led by winding, easy gradients he may scarcely realize that he is mounting until he has reached the summit. To inquire whether Dr. Wills has deliberately done this thing might be an impertinence; that he has done it seems to be apparent; that he has done it well is obvious. He is more than clever; he is able.

To review the matter in detail would exceed the limits of a book notice. A few indications must suffice. After explaining what mental adaptation is, in Chapter II the author tries to answer the question, "What are the general sources and characteristics of faulty adaptations?" that is, of failure: failure to attain a specific end or failure in life. The chapter on symbols, beginning with the simplest, passes by way of the more complex, especially those of language, to the symbolic associations of dreams. Chapter IV, on the continuity of emotion, considers affective displacement, transference, siphoning, sublimation, regression, etc., and leads to the generalization of "the persistence of affectivity independently of the idea to which it attaches." "Types of Dissociation" covers many of the manifestation of hysteria and dementia praecox, and Chapter VI is really an abbreviated exposition of the (somewhat modified) freudian tenets of the unconscious. We quote its conclusion:

> Each mental process, habitual or incidental, leaves its mark upon the personality, sometimes conscious, mostly unconscious. The "memory of a good action" is precious long after the deed is forgotten. Man's special faiths, interests, hobbies, friendships, enmities, ambitions and infatuations are fashioned, not from the fraction of experience he can remember, nor yet from innate features of being he cannot control; but from a body of unconscious experience vaster than knowledge, which imparts to the objects of consciousness, by affective transference, their human values. This mighty and invisible potency of forgotten experience gives added import to all education, and sanction to each daily task.

From the last chapter we quote (p. 303):

> *Happiness is the conscious phase of mental adaptation.* Mental adaptation consists in a balance between the energy the organism has to spend, and the outlets for expending it. The outlets useful for this purpose are balancing factors. . . . We saw that it might be sought in selfish, egoistic ways, or in unselfish, altruistic ways; but that it is more frequently found in the latter. We discussed the bearing of this upon the love-life, which reaches its fullest development in maintenance of family.

These excerpts might indicate that the text is technical and hard reading. It is neither. And it should be emphasized that the author constantly makes a commendable effort to render his psychology immediately utilitarian—a psychology of living as well as of life. Finally, a book that makes the reader think may not be a great book, but it is a good one. This is such a work.

PULMONARY TUBERCULOSIS. A Handbook for Students. By Edward O. Otis, M.D., Professor of Pulmonary Diseases and Climatology, Tufts College Medical School, Boston. Cloth. Price, $1.25. Pp. 220, with 20 illustrations. Boston: W. M. Leonard, 1917.

This book is primarily intended for students of the third and fourth years of medical school. It is written in interesting, pleasing and simple style with a symbolic verse heading each chapter. The book contains only the main essential facts, but they are modern and complete. No time is wasted in discussing unimportant theories, and symptoms and signs are correlated and given due proportionate weight.

# *Medicolegal*

### Advertising Under Name Other than Own to Practice Medicine

*(People vs. Wilkes (N. Y.), 163 N. Y. Supp. 659)*

The Court of Special Sessions, New York County, says that the defendant was charged with having violated Section 174 of the public health law, which provides that any person who shall practice medicine or advertise to practice medicine under a name other than his own shall be guilty of a misdemeanor. As specification of the act constituting the offense, the information set forth, together with a translation into English, an advertisement published in the Russian language in a newspaper, as to which advertisement there was no question but it was one to practice medicine. The defendant by demurrer challenged the sufficiency of the formal charge against him. He contended that the advertisement was not one by him under a name other than his own; that no name of the advertiser, within the meaning and effect of the statute, was contained in the advertisement. In the heading of the advertisement appeared the words "Russian Medical Help, 56 Rivington Street, New York." At the foot of the advertisement, without any words of connection with the rest of the text, and as a distinct element of the paper so published, appeared the same words, "Russian Medical Help," and, under that, the words "Hours 10 a. m. to 10 p. m. First consultation free. Office, 56 Rivington street. Drug store, 34 Rivington Street, New York." The publication contained no other words of identification of the advertiser. In the body of the advertisement the advertiser was represented by the personal pronoun of the first person, sometimes in the singular and sometimes in the plural. The court is of the opinion that the words "Russian Medical Help," as used in the advertisement published by the defendant as set forth in the information, constituted a name, other than the name of the defendant, under which he was advertising to practice medicine, and hence that the information effectively charged a violation of the statute, and that the demurrer of the defendant to the information should be overruled. The word "name," in common usage for particular designation, is applied, not only to the conventional form, but to any word or combination of words used for individual identification, including forms which are descriptive, whether by direct expression of defining quality or by expression of related ideas, in the form of metaphor, metonymy, synecdoche or other figure of speech.

### Limitation of Actions for Malpractice, Especially for Causing Argyria

*(Hahn vs. Claybrook (Md.), 100 Atl. R. 83)*

The Court of Appeals of Maryland says that this action was instituted, Sept. 20, 1915, by the plaintiff against the defendant to recover damages for alleged professional negligence and unskilfulness between the years 1902 and 1910, in that the defendant negligently prescribed for the use of the plaintiff argentum oxid, which was taken in such quantities by her as the patient of the defendant, under his direction and treatment, as to cause argyria or a chronic pigmentation or discoloration of the skin due to silver poisoning. At the conclusion of the testimony on the part of the plaintiff, the trial court directed a verdict for the defendant, on the ground that the plaintiff's suit was barred by the statute of limitations. In this there was no error, and the judgment of the lower court is affirmed.

The question of the defense of limitations in the class of negligence cases, such as was presented by the record in this case, is one not only of considerable interest, but also of importance. Under the Maryland law, if the plaintiff's right of action arose and accrued more than three years before the suit was begun, the relief here sought must be denied. This presented the controlling question on this branch of the case, which was, When did the act or wrong occur from which the plaintiff sustained the injury for which she sought damages in this case, and when did that injury become apparent, so as to give her a right of action, and to then

bring a suit? The general rule, as to when the statute of limitations begins to run, has been stated to be as soon as the cause of action accrues, whether or not it is the case of a trust; if it is a fit subject for a suit at law as well as in equity, the statute of limitations begins to run. The general rule, in cases of neglect of duty arising from contract and the breach of a professional duty by a physician, surgeon or an attorney is held to fall within this rule. In the case at bar, the court thinks the plaintiff, on any aspect of the proof, was clearly barred by the statute of limitations from maintaining the suit, because her cause of action arose and limitations began more than three years before the date when the suit was instituted.

The plaintiff testified that she employed the defendant as a practicing physician, and he prescribed for her from 1904 to some time in the year 1910; that she called on him for treatment about three or five times a year; that she consulted other physicians during that period, but that the defendant treated her for indigestion or stomach trouble; that she took his prescriptions as directed three times a day, half an hour before meals; that in the latter part of 1908 she noticed a change in the color of her skin. It would seem to be clear and to admit of no doubt that, according to the undisputed evidence in the case, the discoloration of the plaintiff began at least in 1908, and, as stated by her husband, "she commenced to get worse in 1908, kept getting worse all along up to 1913, when she was at the worst." The discoloration of her skin, of which she complained to her husband in 1908, was a sufficient indication of an injury to have put her on notice and inquiry, and it was clear from the evidence that if she had exercised ordinary care and diligence to have ascertained her rights, she could have discovered the cause of her alleged injury. The ground of the cause of action in this case was the discoloration of the plaintiff's skin by the use of argentum oxid, and the statute of limitations began to run from the time of the discovery of the alleged injury therefrom. As stated by the court below, when she began to be discolored that showed an injury, and that was the injury of which she had a right to complain. Then was her cause of action.

### Injury to Physician Answering Call

*(Jones vs. Pennsylvania Coal & Coke Corporation (Pa.), 99 Atl. R. 1008)*

The Supreme Court of Pennsylvania affirms a judgment for damages for the plaintiff for personal injuries sustained by him in attempting to use a telephone on the defendant's premises while there in answer to a call received through a boy who said that one Carroll had sent him for a doctor. There had been a severe electrical storm, and lightning had struck a power wire between the substation in which Carroll was the defendant's engineer and a mine shaft, breaking the wire and causing it to fall on the telephone wire. Carroll had been knocked down in trying to answer the telephone and had gone to the boiler house at the shaft, where he found the engineer dead or unconscious. He testified that he said nothing about a doctor, except that one would be of no use as the man was dead; but the jury found that he instructed the boy to summon a physician. The plaintiff testified that he responded immediately to the call and went to the shaft. He found no one in the boiler house except the man lying unconscious or dead on the floor not far from the telephone box. He examined him, but, being unable to determine certainly whether or not he was alive, turned to the telephone to summon aid, and was seriously injured by an electric current.

The plaintiff alleged that the defendant was negligent in the construction, maintenance and operation of the high-tension power line and the telephone line which resulted in his injuries, and the verdict of the jury established that the defendant was negligent, as alleged, while the plaintiff was free from fault. But the defendant denied the right of the plaintiff to recover damages for the following reasons: (*a*) He was a mere licensee on the premises; (*b*) if an invitee, he exceeded his invitation by attempting to use the telephone, and (*c*) the defendant had no knowledge, either express or implied, that the premises were in a dangerous condition, had no time to repair, and did not know that the plaintiff contemplated going on the premises.

The court holds that the emergency and immediate necessity for prompt action to meet it, by summoning the physician, was authority for Carroll to act in the absence of the officers of the company and his inability to communicate with them. The emergency of an accident, or an unusual condition which requires prompt action, may invest the representative of the company, highest in authority, who is then present, with power to do such things as are reasonable to meet the emergency. In other words, holding, as the court does, that the plaintiff was an invitee on the premises at the time he was injured, it followed that it was the defendant's duty to keep the premises in a safe condition that he might not be injured while he was there professionally in response to the invitation. The court does not determine, as it was not involved in the case, that Carroll had implied authority to bind the defendant for professional services rendered by the plaintiff to the injured employee, but simply that he had the authority to invite the plaintiff on the premises for the purpose of rendering aid to the employee, and that the plaintiff went on the premises by express invitation, and not as a licensee.

The court was not favorably impressed with the argument that the plaintiff exceeded his invitation by attempting to use the telephone. It certainly could not be so declared as a matter of law. He did not leave the spot where the body lay to make use of the telephone, and was therefore clearly within the space to which the invitation referred. The telephone was one of the means he attempted to use to carry out the purpose of the invitation. Nor was there any merit in the defendant's contention that there could be no recovery because it had no knowledge or notice that the premises were in a dangerous condition and no time to repair, and did not know that the plaintiff contemplated going on the premises, for the negligence complained of and shown was the defective construction of the power and telephone lines and failure to safeguard against a broken uninsulated power wire falling on the telephone wire.

### Liability of Corporation Undertaking to Treat Hernia—A "Plas-tr-pad" Case

*(Weller vs. Plapao Laboratories Incorporation (Mo.), 191 S. W. R. 1056)*

The St. Louis (Mo.) Court of Appeals reverses a judgment rendered in favor of the defendant, remands the case for further proceedings, and denies the defendant a rehearing, in this action brought by the plaintiff to recover damages for the death of her husband from strangulated hernia after using the defendant's plas-tr-pads. The court says it appeared that the plaintiff's husband had been suffering from hernia for a number of years and had been wearing steel and elastic trusses. Acting for him, the plaintiff wrote in his name, from their home in Tennessee, to the defendant at St. Louis, that, having seen the defendant's advertisement, he wrote for a trial treatment of the defendant's plas-tr-pads for rupture. In response, he received a blank printed slip and book of testimonials, together with some ointment. He, or the plaintiff, filled up the blank and returned it to the defendant with a postal order for $6.75. He then received three plas-tr-pads and directions for applying them. This was in the afternoon of the fifteenth of the month, and the plaintiff applied them to her husband, the appliance consisting of a pad and a belt, the pad containing medicinal matter, as it was said, and intended to press into the hollow and over the protruding intestine, which was to be pushed back, that part of the pad being covered with plaster so that on being affixed to the body of the patient it adhered. After applying this pad, the plaintiff's husband, who was an engineer on a switch engine, went to work and the day after the intestine protruded, he was taken to a hospital, and it was found that he had a case of "locked bowels," resulting from strangulated hernia from which he died on the nineteenth.

Certain cases, while not altogether applicable here, are illustrative of the proposition that a case of this kind falls under the classification of actions for negligence; applied in

one case to a sale of an article containing poisonous fluid; in another, to a case of malpractice. True, the defendant here—a corporation—was not holding itself out as a physician or surgeon, but there was testimony tending to prove that it did undertake, as evidenced by its literature sent to the plaintiff's husband, to treat and cure hernia, and a cure is more than any reputable physician or surgeon usually guarantees. That it undertook to treat the plaintiff's husband for his affliction by mail or correspondence and without a personal inspection and visit, was immaterial. It did undertake to cure him of his affliction, if he used its pad. While the defendant did not hold itself out as a practicing physician and surgeon, when it undertook to treat and even cure hernia or rupture, it surely was under the like obligation of a physician and surgeon to do so with all due care for the life of the patient, or, as here, its customer, and that it exercise the care required to do no injury or furnish no harmful appliance. Failure to do that is actionable negligence; and if injury results, and the party treated dies, then the act of the defendant was a wrongful act. The defendant had no right to send out this appliance unless it knew, or had reason to believe, that it was reasonably safe.

Regarding this as an action to recover damages for negligence, for a wrongful act causing death, the court thinks it was maintainable under either the laws of Tennessee or those of Missouri. The evidence in it was of such a character as rendered it peculiarly one for the determination, in the first instance, by a jury, so the court finds no reason to hold either that the petition failed to state a cause of action, or that the trial court erred in submitting the cause on the evidence to the jury; but for errors in the instructions given the jury, the judgment of that court must be reversed.

## Society Proceedings

### COMING MEETINGS

Amer. Acad. of Ophthal. and Oto-Laryng., Pittsburgh, Oct. 29-30.
American Association of Railway Surgeons, Chicago, Oct. 17-19.
Am. Assn. Obstetricians and Gynecologists, Newark, N. J., Sept. 17-19.
American Electro-Therapeutic Association, Atlantic City, Sept. 11-13.
American Roentgen Ray Society, New York, Sept. 20-22.
Colorado State Medical Society, Colorado Springs, Sept. 25-27.
Delaware State Medical Society, Middletown, Oct. 8-9.
Indiana State Medical Association, Evansville, Sept. 26-28.
Kentucky State Medical Association, Louisville, Oct. 16-18.
Medical Association of the Southwest, Kansas City, Oct. 15-17.
Minnesota State Medical Association, St. Paul, Oct. 10-12.
Mississippi Valley Medical Association, Toledo, O., Oct. 9-11.
Missouri Valley Medical Society, Lincoln, Neb., Sept. 20-21.
Nevada State Medical Association, Reno, Oct. 18-19.
New Mexico Medical Society, Las Cruces, Oct. 4-6.
Pennsylvania State Medical Society, Pittsburgh, Sept. 24-27.
Utah State Medical Association, Salt Lake City, Sept. 12-13.
Vermont State Medical Society, Barre, Oct. 11-12.
Virginia State Medical Society, Roanoke, Oct. 23-26.
West Virginia State Medical Association, Fairmont, Oct. 2-4.
Wisconsin State Medical Society, Milwaukee, Oct. 3-5.

## Current Medical Literature

### AMERICAN

Titles marked with an asterisk (*) are abstracted below.

#### American Journal of Roentgenology, New York

*August, IV, No. 8*

1 *Pelvic Colon and Rectum—Roentgenologically Considered. J. T. Case, Battle Creek, Mich.—p. 373.
2 Roentgenologic Interpretation of Accessory Sinus Variations. H. J. Prentiss, Iowa City, Iowa.—p. 390.
3 Practical Points on Interpretation of Accessory Sinus and Mastoid Plates. F. M. Law, New York.—p. 398.
4 Roentgen Ray Findings in Skull in Cases of Brain Tumors, with Special Reference to Porus Acusticus. G. L. Carr, Boston. —p. 405.
5 Roentgen Department in War Times. W. A. Wilkins, Montreal, Canada.—p. 414.
6 Dental Roentgenography. W. H. Mick, Omaha.—p. 416.

1. See THE JOURNAL, Nov. 11, 1916, p. 1470.

#### Annals of Surgery, Philadelphia

*August, LXVI, No. 2*

7 *Clean and Comfortable Method of Treating Erysipelas Patients. S. M. Milliken, New York.—p. 129.
8 *Nature of Postoperative Leukocytosis in Dog. E. B. Krumbhaar, Philadelphia.—p. 133.
9 *Value of Leukocyte Count in Diagnosis and Prognosis of Acute Appendicitis. H. W. Hewitt, Detroit.—p. 143.
10 *Tumors of Gasserian Ganglion; Report of Operated Case. E. Sachs, St. Louis.—p. 152.
11 *Bone Transplantation from Scapula for Defect in Skull. B. L. Jones, Walla Walla, Wash.—p. 160.
12 Value of Bone and Cartilage Transplants in Rhinologic Surgery. W. W. Carter, New York.—p. 162.
13 Factors Bearing on Mortality in Operations for Biliary Obstruction by Calculus. F. T. Van Beuren, Jr., New York.—p. 169.
14 *Etiologic Relations of Sequelae to Gastro-enterostomy, Together with Description of Simple Operative Technic. P. Gronneru1, Chicago.—p. 177.
15 Postoperative Paralytic Ileus. O. S. Fowler, Denver.—p. 184.
16 Fractures Occurring in Gold Mining Industry. Study of 311 Cases. J. W. Freeman, Lead, S. D.—p. 193.
17 *Nature of Neuropathic Affections of Joints. L. Eloesser, San Francisco.—p. 201.
18 *Anatomic Substitute for Female Breast. W. Bartlett, St. Louis. —p. 208.

7. **Clean and Comfortable Method of Treating Erysipelas Patients.**—The following is suggested by Milliken as making the patient most comfortable during the disease, thereby conserving his energies and perhaps hastening nature's cure. The patient is cleansed and put to bed. Rest is enforced during the acute fever and for two days after the temperature reaches and remains below 100. At the start calomel and salts are given and diet allowed according to the patient's appetite. Fluids are forced during the fever. Sedatives or stimulants are given if indicated. Whenever ichthyol has been applied previously, as so frequently happens, it is removed as thoroughly as possible. Then, if no wound demands local dressing, the entire region attacked by the disease is thickly dusted with powdered stearate of zinc which is reapplied as it falls or is brushed off. If a wound exists, it is treated as a similar wound would be treated in the absence of erysipelas. Thus, the face of a patient with abscess in the eyelids is powdered freely and the eyes kept moist with small compresses renewed from a basin of cold boric acid, a drop or two of 20 per cent. argyrol is placed on the conjunctivae from two to five times in twenty-four hours, according to the local irritation evident. If, in leg cases, periphlebitis or cellulitis develops, an incision is made as soon as fluctuation appears, and then wet dressings of boric acid or magnesium sulphate or dilute alcohol are applied.

8. **Nature of Postoperative Leukocytosis in Dog.**—Krumbhaar's experiments showed that the leukocytosis that followed splenectomy in dogs only differed from other postoperative leukocytoses in the somewhat slower return to normal. Postoperative leukocytosis, and the lesser degrees of leukocytosis that follow narcosis and hemorrhage, Krumbhaar says, are chiefly due to the summoning of new and younger forms of polymorphonuclear cells from the bone-marrow into the peripheral blood stream. The appearance of "intermediate" forms in the blood stream after operation suggests that a relationship exists between the polymorphonuclear leukocyte and so-called transitional cells.

9. **Leukocyte Count in Appendicitis.**—Hewitt points out that the polynuclear count alone is, in the great majority of instances, a reliable index in diagnosis. The correlated absolute and polynuclear counts are of greater value than either count taken alone, especially as regards prognosis. A high absolute count with a high polynuclear count means usually good prognosis (e. g., absolute 35,000, polynuclear 95 per cent.). A high absolute count with a moderately low polynuclear (e. g., absolute 20,000, polynuclear 80 per cent.) means usually a very good prognosis. A low absolute count with a high polynuclear count (e. g., absolute 7,000, with polynuclear 95 per cent.) indicates a grave prognosis (speaking generally). A low absolute count with a low polynuclear count means (e. g., absolute 7,000 with polynuclear 65 per cent.) usually no infection, or that the acute condition is due to anatomic or mechanical causes, in other words, that the infection, if one be present, has not stimulated the resisting powers of the body sufficiently to produce a leukocytosis.

10. **Tumors of Gasserian Ganglion.**—The history of Sachs' case is that in December, 1914, the patient began to have pains along the distribution of the ophthalmic division of the left fifth nerve. This pain gradually spread and two months later involved all three branches and was continuous. At no time was there any cessation of pain. Drugs, climatic conditions, local applications in no way influenced the pain. About this time the woman complained of double vision on looking to the left. Soon after this an impacted molar was removed, but afforded no relief. Some months later her sphenoid and ethmoid sinuses were opened without any improvement in her symptoms. The pain continued without any interruption and with great severity. Stereoscopic roentgenograms showed no abnormality and none of the signs of intracranial pressure. No destruction of bone in the region of the middle fossa could be made out. In the region of the ganglion a smooth tumor about the size of a large cherry was exposed, which lay in a cavity in the floor of the skull about 1 cm. deep. It had apparently completely replaced the ganglion. With great care the tumor was dissected free and in this procedure what were taken to be the third and sixth nerves were exposed on the median side of the tumor. When the patient became conscious she had a complete third and sixth nerve paralysis and a complete motor aphasia with very slight weakness of the right hand. The motor aphasia cleared up at once and had completely disappeared on the fourth day after operation. The grip was normal on the second day. By the ninth day there was no trace of the third nerve paralysis and the sixth nerve paralysis improved steadily, so that finally a month after operation there was no longer any double vision. Another unusual feature and one difficult to explain was that after the third nerve recovered, the pupil which had been dilated (third nerve paralysis) became contracted. In about six or seven weeks the patient returned complaining again of severe pains. The twelfth nerve paralysis was still present. The tumor was again attacked, but was found quite unoperable. A small piece was removed for diagnosis and showed the same histologic picture as the original tumor —endothelioma.

11. **Bone Transplantation from Scapula for Defect in Skull.**—A defect in the skull, measuring approximately 3 cm. by 5 cm., was covered by Jones by placing over it a piece of the wing of the left scapula slightly larger than the opening in the skull.

14. **Etiologic Relations of Sequelae to Gastro-Enterostomy.**—Gronnerud does not use clamps and his suture material is catgut. He describes his technic as follows: The hand is placed on the anterior stomach wall, with the omentum and transverse colon gathered up between the thumb and forefinger pushing the stomach against the mesocolon. The mesocolon is now opened with a blunt forceps, and the tear extended until an elliptical opening about 2½ inches long results; the edges are then attached to the posterior wall of the stomach by four stitches, the end stitches being left long and used as temporary guides. If the mesenteric attachment of the bowel is far enough to the right, bring the bowel straight up in prolongation of the duodenum; if not, turn the bowel from left to right, otherwise a kink at the duodenojejunal junction will result, with the probability of obstruction. The bowel is now brought up into juxtaposition with the stomach and guides placed at each end, the first guides being now cut. An over-and-over Lembert suture is then used. The assistant now exerts steady traction on the guides, thus preventing leakage, and the stomach and bowel are opened. The same suture is used to whip over and over with a through-and-through stitch, so as to coaptate the mucous surfaces. With a Cushing stitch, the anterior stomach and bowel walls are coaptated, and the operation finished with a Lembert suture, making two rows of sutures all the way around. Number 1 pyoktanin catgut is used exclusively.

17. **Nature of Neuropathic Affections of Joints.**—Eloesser found that bone and joint lesions corresponding to those found in tabes dorsalis may be induced experimentally in the limbs of cats by severing the posterior nerve roots (the sensory fibers) leading from the limb. Severing the posterior roots causes no atrophy of the bone. Tabic fractures and arthropathies have been produced in healthy animals, hence they cannot be ascribed primarily to lues or other infectious causes. The course of a deforming arthritis is not characteristically altered by the addition of an analgesic factor, hence the cause of the Charcot joint is not to be sought in a simple deforming arthritis occurring in a tabetic. Nothing in these experiments gives proof of the existence of trophic nerves. Of three animals whose joints were subjected to operative trauma after having previously been rendered anesthetic by resection of posterior roots, all rapidly developed Charcot lesions. Trauma in a limb rendered anesthetic and analgesic experimentally leads to grotesque lesions of the bone and joints, which are in every way the counterparts of tabic fractures and arthropathies; trauma and lack of the warning sense of pain are the cause of most tabic bone and joint lesions.

18. **Anatomic Substitute for Female Breast.**—The operation described by Bartlett is most frequently indicated in cases of chronic fibrocystic mastitis, which is generally admitted to be a precancerous condition; hence Bartlett shells out the entire gland-bearing area with the cautery, leaving the skin covering intact. Cosmetic considerations have led him to fill out the defect with fat taken from other portions of the patient's body. The various steps of the operation are given in detail, namely: 1. With patient in the sitting posture, the affected breast is lifted and a mark made in the fold which will be hidden by the pendent organ when it is allowed to assume its normal position. 2. Patient is covered with two sterile sheets, attached to the skin in such a manner as to expose two areas; one revealing the affected breast, the other, the lower abdomen or thigh on the same side. 3. A crescentic incision is made below the breast following the line marked out in Step 1. The breast is lifted off the chest wall, all attachments being divided with the cautery and the pocket filled with a pack. 4. The skin covering the gland is peeled back with the cautery, while downward traction is exerted on the mass to be removed. 5. From the anterior abdominal wall, the outer aspect of the thigh, or the buttocks, enough subcutaneous fat is removed to constitute a mass approximately 50 per cent. larger than that which has been extirpated, thus allowing for shrinkage which always takes place. This is to be stuffed into the breast defect and allowed to conform to its new surroundings. The operation has been performed successfully on six patients.

## Archives of Internal Medicine, Chicago

*August, XX, No. 2*

19 *Error in Electrocardiogram Arising in Application of Electrodes. H. E. B. Pardee, New York.—p. 161.
20 *Studies in Protein Intoxication. Blood Coagulation. H. F. Shattuck, New York.—p. 167.
21 *Emetin Diarrhea—Clinical and Experimental. A. R. Kilgore and J. H. Liu, Shanghai, China.—p. 178.
22 *Oxidase Reaction of Cells in Normal and Leukemic Blood. H. Rosenthal, New York.—p. 184.
23 *Relation of Pellagra to Location of Domicile in Spartan Mills, S. C., and Adjacent District. J. F. Siler, P. E. Garrison and W. J. MacNeal, New York.—p. 198.

19. **Error in Electrocardiogram Arising in Application of Electrodes.**—The error discussed by Pardee consists in the fact that when a constant difference of potential is applied at two points of the circuit containing the galvanometer and the patient, the resulting deflection of the string takes the form of a quick jump, as quick as the instrument can make, followed by a slow partial return toward the base line. The return takes the form of a curve and has a duration of from 0.1 to 0.4 second in different instances, being short when the overshoot is small, longer when it is large. When the string reaches this new level the deflection remains constant, the movements due to the heart's currents being superposed on this new base line as they were on the former one. The overshooting and slow return are usually evident to the eye of the observer in the process of standardization which is carried out before taking each lead of the electrocardiogram. To avoid this source of error the most important measure has been found to be the application of a hot bandage. The salt solution should be hot, preferably about 105 F., so that it

stings the hand of the person applying the bandages. Of lesser importance has found to be a thorough rubbing and wetting of the skin of the extremity before the bandage is applied. This alone will not usually suffice, but is an important accessory measure.

20. **Studies in Protein Intoxication.**—Shattuck studied the coagulation time of the whole blood, the prothrombin time and antithrombin content in two cases of serum sickness following the injection of antipneumococcus serum in cases of lobar pneumonia, and cases of urticaria before and after treatment with autogenous or heterogenous serum. The blood of patients suffering from serum sickness showed a marked delay in the coagulation time of the whole blood, and of the prothrombin time during the serum sickness, with a later fall to nearly, but not entirely, normal figures for both after the disappearance of the serum sickness. The results with the antithrombin content were inconclusive. Studies of the blood of patients suffering with chronic urticaria showed a delayed coagulation time and prothrombin time in four out of five cases, with an approach to normal figures after the patients had been treated intravenously with autogenous or heterogenous serum in three cases out of four.

21. **Emetin Diarrhea.**—Three cases are reported by Kilgore and Liu in which the diagnosis of emetin diarrhea produced in the course of treatment for amebic dysentery, is reasonably certain. Recovery was prompt on discontinuing the emetin. The authors have seen a fourth case, terminating fatally, in which the same diagnosis was made, but have not reported this case in detail on account of failure to secure a necropsy. All of these cases were in children and all had received doses considerably larger than would be proportionate on a basis of 65 mg. (1 grain) for an adult. This fact is especially interesting in view of the opinion not infrequently held that children are more resistant to emetin than adults. The authors give doses of 65 mg. (subcutaneously or intravenously) to adults and to graduate doses for children proportionately, watching carefully for any increase in the diarrhea which might be due to emetin. Experiments of others and those reported by Kilgore and Liu furnish abundant evidence of the tendency of emetin to produce in dogs a hemorrhagic gastro-enteritis with hemorrhages in the lymph glands, spleen, kidneys, thymus, etc., ultimately resulting in death, even if the emetin be stopped as soon as definite symptoms are observed.

22. **Oxidase Reaction of Cells in Normal and Leukemic Blood.**—Rosenthal says that morphology, with good polychromatic staining of the blood cells, is of greater importance in the identification of the leukemias than the oxidase reaction.

23. **Relation of Pellagra to Location of Domicile.**—The studies recorded in this paper are said to support the authors' previous conclusion that pellagra is an infectious disease, which spreads slowly, attacking only a small proportion of the population residing in the immediate vicinity, and further, that its spread is especially favored by insanitary methods for the disposal of human wastes.

### Archives of Pediatrics, New York

*July, XXXIV, No. 7*

24 Acidosis in Infancy and Childhood. A. D. Smith, Brooklyn.—p. 483.
25 *Etiology of Mongolian Imbecility. C. Herrman, New York.—p. 494.
26 *Acute Ileocolitis in Infancy. J. Aikman, Rochester.—p. 504.
27 *Deficient Bone Development of Congenital Origin. C. J. Bloom, R. E. Stone and A. Henriques, New Orleans.—p. 512.
28 Heat and Infant Mortality. C. C. DuBois, Warsaw, Ind.—p. 516.

25. **Etiology of Mongolian Imbecility.**—Herrman is of the opinion that there is no positive evidence that worry, emotional shock, illness during pregnancy or congenital syphilis are important or essential factors in the causation of mongolian imbecility. The evidence that mongolian imbecility is a unit character and recessive, although not conclusive, is regarded as being suggestive.

26. **Acute Ileocolitis in Infancy.**—Fifty-four cases of ileocolitis are analyzed by Aikman. Twenty-seven were under 6 months of age, eight between 6 and 12 months, and twelve between 1 and 2 years, and all occurred in the summer or early fall. Few gave a history of any previous diseases. There were but four breast-fed children in the series and nine fed on modified milk. Fourteen had been fed on condensed milk formulas previous to admission and several on barley water mixtures of little or no food value for a considerable length of time. Insanitary home conditions, poverty, and general carelessness in food preparation acted as etiologic factors. The total mortality for the series was 33.3 per cent. The younger the child the worse the prognosis. A child under 6 months of age, who is poorly nourished and has been fed on condensed milk, has very little chance for recovery if his temperature is over 102 F., if he is vomiting, and has eight liquid, green stools with much mucus and a little blood daily, even if the pulse is slow and the abdomen shows nothing. He has no chance if he is having convulsions. The duration of the cases studied averaged fifteen days, those recovering were sick about three weeks and those who died averaged nine days. If the child survives the first week, Smith says, his chances for recovery are much better. This series demonstrated the danger of infection and also that the convalescing child may infect others, especially younger children. This makes prophylactic measures of greatest importance. It is best to omit all milk from the diet for a few days. As a substitute give cereal water with or without sugar. Sugar should be omitted if the stools are of a frothy character. Barley water is used by many but rejected by a few. Fresh weak tea has considerable value as a substitute for milk. The returning to a milk diet should be done gradually and carefully, first adding sugar, later skimmed milk and then whole milk. One of the commonest faults is to give too large feedings. Very small amounts should be used frequently, especially if there is vomiting. Bismuth subnitrate in 10-grain doses, precipitated sulphur, 1 grain, and salol may be of value. Dover's powder or paregoric is also used. Some claim that small doses of castor oil will help to control the diarrhea. Serums are of little value and bulgaricus bacillus cultures cannot be depended on in very many cases. Local treatment consists of high rectal irrigations given through a No. 25 French catheter. Large quantities, a gallon or more, may be used if a free return flow is allowed. One or two irrigations a day are enough and they should be stopped if there is an increase in the number of stools. The after-care consists of careful supervision of the diet, observation of the stools and frequent records of the temperature.

27. **Deficient Bone Development.**—The authors report one case of congenital absence of condyles of the femur (syphilis) and two cases of congenital absence of coccyx and congenital backward deviation and shortening of coccyx.

### Boston Medical and Surgical Journal

*August 16, CLXXVII, No. 7*

29 Industrial Benzol Poisoning in Massachusetts. T. F. Harrington, Boston.—p. 203.
30 Essential Shrinking of Conjunctiva in Acute and Chronic Pemphigus; Report of Two Cases. F. A. Conlon, Lawrence.—p. 206.
31 *Intestinal Adhesions and Peritoneal Bands in Epileptics. H. Caro, Palmer.—p. 208.
32 Comparative Study of Feeblemindedness and Psychopathic Personality Among Offenders in Court. V. V. Anderson, Boston.—p. 210.
33 Hearing Tests from Practical Standpoint. G. L. Richards, Fall River.—p. 213.
34 Epidemic of Dysentery at Boston State Hospital, Due to Member of Paratyphoid-Enteritidis Group. M. E. Morse and G. Hyron, Boston.—p. 216.

31. **Intestinal Adhesions and Peritoneal Bands in Epileptics.**—In a review made by Caro of 775 necropsy protocols of patients in a general hospital, the incidence of intestinal adhesions and peritoneal bands was found to be relatively the same (18.3 per cent.) as in a series of 280 necropsies on epileptics. Hence, Caro believes that the constipation of epileptics cannot be said to be due to factors differing from those usually considered in the colonic stasis of other patients. Intestinal adhesions and peritoneal bands are due to congenital defects, acute inflammatory processes, or mechanical causes. Such processes are no more frequent in epileptics than in nonepileptics. Intestinal anomalies are not present in any greater proportion in epileptics than in other persons.

### Colorado Medicine, Denver

*August, XIV, No. 8*

35 Chronic Appendicitis and Its Gastric Relations. H. A. Black, Pueblo.—p. 213.
36 Rupture of Abdominal Viscera Due to Nonperforative Force. W. T. H. Baker, Pueblo.—p. 216.
37 Social Health Insurance. J. M. Shapiro, Denver.—p. 220.
38 Cystoscopy in Insane. P. Work, Pueblo.—p. 225.

### Delaware State Medical Journal, Wilmington

*April, VIII, No. 4*

39 Ethyl Chlorid Anesthesia. J. S. Keyser, Wilmington.—p. 5.

*May, VIII, No. 5*

40 Serum Therapy of Pneumonia. E. Mayerburg, Wilmington. —p. 5.

*June, VIII, No. 6*

41 Appendicitis as Complication of Pregnancy. A. P. Heineck, Chicago.—p. 3.
42 Hypopyon-Keratitis. R. B. Hopkins, Milton.—p. 6.

*July, VIII, No. 7*

43 New Treatment for Status Epilepticus. W. Held, Chicago.—p. 3.

### Iowa State Medical Society Journal

*August, VII, No. 8*

44 Disease of Internal Ear in Its Relation to General Medicine. G. E. Shambaugh, Chicago.—p. 291.
45 Eye-Strain and Higher Education, Iowa City.—p. 296.
46 Review of Recent Literature on Congenital Syphilis. F. S. Clarke, Omaha.—p. 301.
47 Intestinal Origin of Epilepsy; Report of Case. L. A. Baldwin, Riverton.—p. 304.
48 Treatment of Acute Tonsillitis by Enucleation. I. S. Buzard, Waterloo.—p. 305.
49 Recent Ideas of Iridocyclitis with Special References to Focal Infection; Report of Cases. J. E. Reeder, Sioux City.—p. 305.
50 Case of Sporotrichosis from Northern Life Country. C. F. Wahrer, Ft. Madison.—p. 307.

### Journal of Biological Chemistry, Baltimore

*August, XXXI, No. 2*

51 Light Production at Low Temperatures by Catalysis with Metal and Metallic Oxid Hydrosols. B. C. Gross, Princeton, N. J. —p. 271.
52 Blood Fat in Domestic Fowls in Relation to Egg Production. D. E. Warner and H. D. Edmond.—p. 281.
53 Tritico Nucleic Acid. B. E. Read and W. E. Tottingham, Baltimore.—p. 295.
54 *Proteoclastic Tissue Enzymes of Spleen. M. Morse, Chicago. —p. 303.
55 Comparative Metabolism of Certain Aromatic Acids. C. P. Sherwin, New York.—p. 307.
56 Studies on Bioluminescence. Mechanism of Production of Light During Oxidation of Pyrogallol. E. N. Harvey, Princeton, N. J. —p. 311.
57 Structure of Purine Mononucleotides. W. Jones and B. E. Read, Baltimore.—p. 337.
58 Similarity of Action of Salts on Swelling of Animal Membranes and of Powdered Colloids. J. Loeb, New York.—p. 343.
59 *Metabolism of Sulphur. Influence of Small Amounts of Cystine on Balance of Nitrogen in Dogs Maintained on Low Protein Diet. H. B. Lewis.—p. 363.
60 *Nutrition Investigations on Cottonseed Meal. A. E. Richardson and H. S. Green, Austin, Texas.—p. 379.
61 Availability of Energy of Food for Growth. C. R. Moulton, Columbia, Mo.—p. 389.
62 *Chemical Differentiation of Central Nervous System. Relative Amount of Sheathing Substance in Corpus Callosum and Intradural Nerve Roots (Man and Dog). W. Koch and M. L. Koch. —p. 395.
63 Effect of Different Salts on Ammonia Formation in Soil. G. P. Koch, New Brunswick, N. J.—p. 411.
64 Behavior of Chickens Restricted to Wheat or Maize Kernel. E. B. Hart, J. G. Halpin and H. Steenbock, Madison, Wis.—p. 415.
65 *Studies in Calcium and Magnesium Metabolism. Effects of Base and Acid. M. H. Givens and L. B. Mendel, New Haven, Conn. —p. 421.
66 *Id. Effect of Diets Poor in Calcium. M. H. Givens, New Haven, Conn.—p. 435.
67 *Id. Effect of Fat and Fatty Acid Derivatives. M. H. Givens, New Haven, Conn.—p. 441.
68 Relation of Quality of Proteins to Milk Production. E. B. Hart and G. C. Humphrey, Madison, Wis.—p. 445.
69 *Study of Effect of Hydrochloric Acid on Mineral Excretion of Dogs. R. L. Stehle, Philadelphia.—p. 461.
70 *Relation of Epinephrin Hyperglycemia to Decreased Alkali Reserve of Blood. J. P. Peters, Jr., and H. R. Geyelin, New York. —p. 471.

54. **Proteoclastic Tissue Enzymes of Spleen.**—Although other investigators have shown that an enzyme or enzymes exist in the spleen, capable of hydrolyzing peptone and also fibrin, Morse found that the proteins of the spleen itself, however, autolyze only in neutral or acid, not in alkaline solution. The most rapid autolysis was observed in the most acid solution tested. Therefore, from the standpoint of necrosis, the α-protease of Hedin can scarcely be operative since there is no evidence that it affects native proteins. Morse suggests that it is probable that the α-protease of Hedin is not an autolytic enzyme, but rather a heterolytic one, resident in the white blood cells, for such an enzyme has been described, definitely, for such cells.

59. **Metabolism of Sulphur.**—Lewis found that the addition of small amounts of cystin to the diet of dogs on a low protein diet diminished the loss of nitrogen from the body and favorably influenced the nitrogen balance. This is interpreted to be the result of a specific demand for cystin for metabolic purposes, since tyrosin and glycocoll added to the diet under like conditions of experimentation did not diminish the nitrogen loss or influence the condition of nitrogenous equilibrium.

60. **Nutrition Investigations on Cottonseed Meal.**—According to Richardson and Green, 20 per cent. of the water extract of cottonseed flour dried on starch, equivalent per gram to 2.5 gm. of cottonseed flour, i. e., 50 per cent. cottonseed flour in the diet, contains sufficient water-soluble food accessory for normal growth. Four and thirty-five hundreths per cent. of the ether extract of cottonseed flour equivalent per gram to 11.5 gm. of cottonseed flour, i. e., 50 per cent. cottonseed flour in the diet, does not contain sufficient fat-soluble food accessory for normal growth, but 12 per cent. of the ether extract appears quite as efficient in supplying enough of the fat-soluble accessory for normal growth as does an equivalent amount of butter fat. Eighteen per cent. cottonseed protein when supplied with adequate amounts of all other necessary nutritive factors induces practically normal growth in the male rat, and better than average growth in the female, and fairly normal reproduction, with high mortality among the second generation. At the age of 148 days the male of the second generation is about four-fifths average size and the female slightly under size. Twelve per cent. cottonseed protein does not induce perfectly normal growth. On this diet one female has borne three young, all of which are alive at the age of 269 days, although below average size. Normal growth has not been obtained on 9 per cent. cottonseed protein but at the age of 155 days one animal, No. 310, has borne a fine looking litter of eight young, all of which she devoured. Very little growth has been obtained with 6 per cent. protein, the average gain in weight during 108 days being 8 to 9 gm. With only 4 per cent. cottonseed protein rats have fallen off in weight when first placed on this diet, but have almost successfully maintained their weight for fifty days thereafter.

62. **Chemical Differentiation of Central Nervous System.**—The Kochs found that the quantity of the sheathing substance appears to be nearly the same in the callosum fibers of man and of the dog. Moreover, the amount of sheathing substance of the fibers of the intradural nerve roots is in the dog like that found in the callosum, although a higher percentage of phosphatide and a lower percentage of water-soluble phosphorus appear to be characteristic for the nerve roots in both man and the dog. In man, however, the intradural nerve roots appear to have somewhat less sheathing substance, possibly a species difference, possibly due to some other cause. The approximate similarity in the amount of sheathing substance formed on the peripheral and on the central nerve fibers (though the latter are devoid of neurilemma) in two of the higher mammals, and the fact that the amount of sheathing substance in the callosum of man is similar to that in the callosum of the dog—and in the case of the intradural nerve roots not so very different—are the large results to which attention is especially directed.

65. **Studies in Calcium and Magnesium Metabolism.**—The observations made by Givens and Mendel demonstrate that the administration of base or acid produced no significant effect on the balance of nitrogen, calcium, magnesium, and phosphorus in the dog. Administration of hydrochloric acid increased the urinary excretion of calcium and thereby altered the relation of calcium to magnesium in the urine.

The calcium contained in milk was more effective than soluble calcium lactate in producing calcium retention. Administration of large doses of alkali bicarbonate to a human diabetic did not decrease the urinary output of calcium.

66. **Effect of Diets Poor in Calcium.**—From the data submitted by Givens it is evident that diets poor in calcium are not conducive to positive calcium balance even when an abundance of nitrogenous food is available.

67. **Effect of Fat and Fatty Acid Derivatives.**—Here Givens shows that poor utilization of fats or fatty acids may increase the excretion of lime in the feces and prevent the storage of calcium even when the calcium intake is comparatively abundant.

69. **Study of Effect of Hydrochloric Acid on Mineral Excretion of Dogs.**—The administration of hydrochloric acid by mouth to the dog caused an increased excretion of calcium and magnesium as well as of sodium and potassium, but in the case of the latter a compensatory retention makes the loss apparent rather than real. If, Stehle says, an analogous condition holds in human diabetes the resulting calcium loss may be something to take into consideration in the treatment of diabetic patients in whom the excretion of hydroxybutyric acid has reached a significant figure.

70. **Relation of Epinephrin Hyperglycemia to Decreased Alkali Reserve of Blood.**—The hyperglycemia produced by Peters and Geyelin by subcutaneous injection of epinephrin in three cases of diabetes and two normal individuals was accompanied by simultaneous diminution of the alkalinity of the blood. This taken in conjunction with other experimental evidence strongly suggests that decreased alkalinity of the blood plays a very important rôle in the production of hyperglycemia of this type. Vasoconstriction as demonstrated by peripheral hypertension was not of prime importance in producing the changes noted.

### Kansas Medical Society Journal, Topeka

*August, XVII, No. 8*

71 Treatment of Heart Failure Based on Diagnosis of Function of Heart Muscle That Is at Fault. P. T. Bohan, Kansas City, Mo.—p. 207.
72 Relation of Gallstones to Cancer of Gallbladder; Report of Cases. L. F. Barney, Kansas City.—p. 213.
73 Private Hospital as Investment. T. A. Jones, Hutchinson.—p. 216.

### Medical Record, New York

*August 18, XCII, No. 7*

74 U. S. Pharmacopeia, IX. H. C. Wood, Jr., Philadelphia.—p. 265.
75 Rationale, Indications, and Contraindications of Nauheim Bath. C. W. Lieb, Watkins, N. Y.—268.
76 Presenile Gangrene. C. Goodman, New York.—p. 275.
77 Balanced Diet Analyzed. R. H. Rose, New York.—p. 276.
78 Stages of Tabes Dorsalis, Based on Study of 240 Cases. M. Grossman, New York.—p. 278.
79 Some Possibilities in Treatment of Tuberculous Insane. N. B. Burns, North Wilmington, Mass.—p. 280.
80 Some Reflections on Surgery of War, Viewed After Three Years. C. G. Cumston, Geneva, Switzerland.—p. 283.

### Medicine and Surgery, St. Louis

*August, I, No. 6*

81 Some Ethical Problems in Gynecology and Obstetrics. W. A. N. Dorland, Chicago.—p. 565.
82 Organotherapy of Menstrual Disorders. E. Novak, Baltimore.—p. 576.
83 Treatment of Eclampsia. (Toxemias of Pregnancy). R. W. Holmes, Chicago.—p. 586.
84 Leucorrhea. H. Schmitz, Chicago.—p. 496.
85 Combined Rectovaginal Examination. F. L. Adair, Minneapolis. p. 601.
86 Cancer of Rectum in Female. F. G. DuBose, Selma, Ala.—p. 607.
87 How Great Men Are Produced. C. L. Redfield, Chicago.—p. 612.
88 Amenorrhea, Dysmenorrhea, Sterility and Endometritis as Rule Relieved by Silver Stem Pessary when Other Treatments Fail. J. H. Carstens, Detroit.—p. 617.
89 Varicocele in Female. W. E. Darnall, Atlantic City, N. J.—p. 624.
90 New Shoe for Wear During Pregnancy. J. Grossman, New York.—p. 631.
91 Cyst of Femur Treated by Tibial Bone Transplant. F. Warner, Columbus, O.—p. 636.
92 Hematuresis. J. T. Windell, Louisville, Ky.—p. 643.

### New York Medical Journal

*August 11, CVI, No. 6*

93 Present Day Aspects of Laryngeal Tuberculosis. H. Arrowsmith, Brooklyn.—p. 245.
94 Primitive Medicine Man's Virtues. (Concluded.) J. Wright, Pleasantville.—p. 248.
95 Diagnosis of Early Cancer of Stomach. A. Bassler, New York. —p. 252.
96 Diagnostic Teeth. P. W. Roberts, New York.—p. 256.
97 Prophylactic Inoculation in Tetanus. J. Rudis-Jicinsky, Chicago. —p. 259.
98 Functional Neuroses. A. Stern, New York.—p. 261.
99 Island Flaps. J. F. S. Esser, Vienna.—p. 264.
100 Hallux Valgus; New Operative Procedure. J. E. Fuld, New York. —p. 265.
101 Case of Double Strangulated Femoral Hernia. W. J. Woolston, Chicago.—p. 367.
102 Use of Inexpensive Drugs in Practice. (To be continued.) L. T. de M. Sajous, Philadelphia.—p. 280.

*August 18, CVI, No. 7*

103 Relationship of Syndrome of Anaphylaxis to Vegetative Nervous System. F. M. Pottenger, Monrovia, Cal.—p. 293.
104 Erysipelas as Complication of Mastoiditis. H. Hays, New York. —p. 297.
105 Nasal Obstruction Factor in Production of Disease. W. P. Porcher, Charleston, S. C.—p. 301.
106 Scope and Utility of Fluoroscopy. I. S. Hirsch, New York.—p. 303.
107 Refractive Errors Causing Retardation in School. W. M. Carhart, New York.—p. 309.
108 Paraffin Wax Treatment for Burns. C. A. Behney, Philadelphia. —p. 312.
109 Etiology and Treatment of Bronchial Asthma. M. J. Gottlieb, New York.—p. 313.
110 Race Retrogression. R. H. MacNair, Springfield, Mass.—p. 315.
111 Case of Blindness and Focal Infection Due to Ethmoiditis: Cured. H. Rodman, New York.—p. 316.
112 Medical Department of United States Army. General Organization of Army. W. W. Reno.—p. 317.
113 Comment on Exemption Boards. J. M. Mabbott, New York.—p. 318.

### New York State Journal of Medicine

*August, XVII, No. 8*

114 *Present Status of Serum Therapy. R. I. Cole, New York.—p. 347.
115 *Present Status of Vaccine Therapy. W. B. Stone, Schenectady. —p. 357.
116 *Present Status of Drug Therapy. W. Coleman, New York City. —p. 361.
117 *Present Status of Physiologic Therapy. J. J. Levy, Syracuse. —p. 363.
118 *Early Diagnosis of Poliomyelitis. W. D. Ayer, Syracuse.—p. 368.
119 Defective Nutrition in Early Life. E. H. Bartley, Brooklyn.—p. 375.
120 Hospital Surgeon: His Economics and Standardization of His Work. W. L. Duffield, Brooklyn.—p. 379.
121 *Complete Avulsion of Scalp. F. H. Flaherty, Syracuse.—p. 382.
122 Present Food Problem. E. S. Haswell, Albany.—p. 384.

114. **Present Status of Serum Therapy.**—Cole presents his conception of the present state of serum therapy, the advantages as well as the pitfalls associated with it. He says that if we disregard all the chaff and consider only those forms of serum therapy in which the value is well proved, we must believe that this form of therapy has been of the greatest good to mankind. He advises that the practicing physician should keep close to earth and employ only that which has been tried and found to be of value.

115. See THE JOURNAL, June 9, 1917, p. 1777.

116. See THE JOURNAL, June 2, 1917, p. 1656.

117. See THE JOURNAL, June 2, 1917, p. 1656.

118. **Early Diagnosis of Poliomyelitis.**—One hundred and two acute cases are analyzed by Ayer. Fever was present in every case. The average temperature observed was 102.2, the highest range being 104.8. Headache was noticed in all but one of the cases. Rigidity of the neck was found in ninety-eight cases and was quite characteristic. Drowsiness was found in ninety cases. Tremor and muscular twitching was noted in forty-two cases and described by the parents in twenty others. Vomiting was described in the attack, in forty-one cases. In thirty-nine cases constipation was obstinate, resisting all medication. Difficulty in urination was present in sixty cases; sweating in twenty-two cases. This accompanied the severer types, and was noted in ten of the cases going on to bulbar involvement. No distinctive

disturbances of the reflexes were observed. In twelve early cases they were exaggerated, in twenty-nine the patella, abdominal or cremasterics were absent. The pupillary reflex was retained in all cases. Diplopia was present in eight cases. The kernig was not constant—a definite kernig was observed only in eighteen instances. Pain was a finding of indefinite character, pain in the back and limbs being mostly complained of. A persistently severe pain in one or more extremities often preceded the appearance of paralysis in that location. Redness of the throat and heavily coated tongue were common findings. Of the forty-two cases developing paralysis, eleven were of the true bulbar type, ten of whom died from respiratory paralysis. Of the thirty remaining cases fourteen showed paralysis of an entire extremity or more, with five deaths. Six cases developed facial paralysis and ten show partial and slight involvement of an upper or lower extremity. Ayer believes that the early stage of poliomyelitis is characterized by a distinct clinical picture and that, in the presence of an epidemic, any case presenting with headache, fever and rigidity of the neck should be considered a case of poliomyelitis until proved otherwise.

121. See THE JOURNAL, June 9, 1917, p. 1778.

### Northwest Medicine, Seattle

*August, XVI, No. 8*

123 Medical Man in Military Service. C. S. Moody, Hope, Ida.—p. 223.
124 War Experiences in England and France. (Concluded.) R. D. Forbes, Seattle, Wash.—p. 227.
125 Clinical Methods for Studying Kidney Functions. C. S. Wilson, Tacoma, Wash.—p. 231.
126 Discussion of Urologic Cases. H. Partridge, San Francisco. —p. 234.
127 Practical Hints in Urinalysis. E. L. Whitney, Portland, Ore. —p. 236.
128 Some Points in Treatment of Acute Gonorrhea by General Practitioner. L. G. Johnson, Marshfield, Ore.—p. 238.

### Tennessee State Medical Association Journal, Nashville

*August, X, No. 4*

129 Symptomatology and Diagnosis of Empyema of Accessory Sinuses of Nose. H. Wood, Nashville.—p. 135.
130 Treatment and Prognosis of Catarrhal and Suppurative Inflammations of Nasal Accessory Sinuses. H. Ezell, Nashville.—p. 139.
131 Fecal Fistulas. G. R. West, Chattanooga.—p. 149.
132 *Non-Specific Measures in Treatment of Certain Infections. J. O. Manier, Nashville.—p. 153.
133 Chronic Indurative Pancreatitis. Pancreatectomy. Presentation of Specimen. W. B. Burns, Memphis.—p. 160.
134 Cystoscope in Diagnosis and Treatment of Disease of Urinary Tract. J. E. Hall, Nashville.—p. 164.

132. See THE JOURNAL, April 28, 1917, p. 1286.

## FOREIGN

Titles marked with an asterisk (*) are abstracted below. Single case reports and trials of new drugs are usually omitted.

### British Journal of Surgery, Bristol

*July, V, No. 17*

1 Interrelation Between Roentgenography and Surgery of Gunshot Wounds of Head. H. E. Gamlen and S. Smith.—p. 17.
2 *Repair of Injuries to Skull by Thin Perforated Silver Plates. A. B. Mitchell.—p. 40.
3 *Reparation of Cranial Defects by Means of Cartilaginous Grafts. H. L. W. Woodroffe.—p. 42.
4 *Septic Peritonitis: Treatment by Cecostomy. A. J. Nyulasy.—p. 53.
5 Ulceration of Colon in Neighborhood of Gunshot Wounds. J. S. Dunn and H. Drummond.—p. 59.
6 *Early Treatment of Gunshot Fractures of Thigh. C. M. Page and A. B. Le Mesurier.—p. 66.
7 Splints for Treatment of Gunshot Fractures of Long Bones. J. H. Pringle.—p. 100.
8 Carrel Treatment of Wounds. G. Barling.—p. 116.
9 Treatment of Hemorrhage Caused by Gunshot Wounds of Face and Jaws. V. H. Kazanjian and H. Burrows.—p. 126.
10 Oral and Plastic Surgery and Prosthetic Appliances. A. C. Valadier and H. L. Whale.—p. 151.
11 Case of Mycloma of Tendon Sheath. F. C. Pybus.—p. 172.
12 Case of Thrombosis of Considerable Portion of Superior Mesenteric Vessels without Any Discoverable Cause. O. L. Addison. —p. 173.
13 Localized Traumatic or Direct Gangrene. A. W. Nuthall.—p. 175.
14 Case of Fibroid Tumor of Stomach. E. W. H. Groves.—p. 176.
15 Case of Intraperitoneal Perforation of Ulcer of Urinary Bladder. H. S. Newland and H. Rayson.—p. 177.

2. **Repair of Injuries to Skull by Thin Perforated Silver Plates.**—For some time past Mitchell has been in the habit of repairing gaps in the skull by the use of very thin perforated silver plates. The silver is rolled out a little thinner than an ordinary visiting card, and is then punched with holes one eighth of an inch in diameter, as close together as possible. This is said to have the following advantages: 1. Being very thin, the plate can be readily adapted to the convexity of the skull. 2. The perforations have the advantages that they lighten the plate; they admit of the escape of blood or other fluid, so as to avoid compression by accumulation between the plate and the dura or brain; and they provide a simple means of fixing the plate in position. The plate is applied as follows: A large flap of scalp is turned down. The opening in the skull is explored, any foreign body is removed, adhesions are freed, and bleeding is arrested. The periosteum is now carefully raised from the skull for about half an inch all round the gap. The plate, cut the necessary size and shape (half an inch in diameter larger than the opening it is desired to close), is now slipped under the reflected periosteum and fixed in position by a series of catgut sutures which, by the aid of a fully curved needle, are carried through the periosteum and out through any of the perforations in the plate which are most convenient. In this way the plate is securely fixed in position and cannot slip. The scalp flap is now sutured in position, and a drainage tube inserted at the most dependent angle for twenty-four hours—otherwise a hematoma is very likely to form. Needless to say the most rigid asepsis must be observed.

3. **Reparation of Cranial Defects by Means of Cartilaginous Grafts.**—The grafts used by Woodroffe are taken from the sixth, seventh and eighth costal cartilages, and for convenience are cut from the same side as the head wound. The usual incision is one parallel to and a little above the costal margin. A vertical incision, two finger-breadths outside the edge of the sternum gives equally good access; can more easily be extended if necessary; the hemorrhage is less; and it has the great advantage of splitting instead of cutting across the upper fibers of the rectus. The cartilages having been thus exposed, shavings are taken of about half their thickness. Care should be taken not to cut through the entire thickness of a fixed cartilage. Each graft, as cut, is dropped into warm saline solution. The chief difficulty is to keep these from slipping. A very simple and rapid method is that of Villandre. One end of a fine catgut stitch is passed through the pericranium, and tied. It is then passed through the pericranium on the other side of the gap, and taken backward and forward in a zigzag manner till the hole is covered in with a trellis. In the case of a very large gap it is wise to supplement this network by a second, at right angles to it, and to insinuate the grafts between the two layers. This gives a small chamber bounded by the dura, the edges of the skull and the trellis, into which the grafts can be slipped with forceps. It is advised to apply the perichondral surface to the dura, in order to avoid adhesions; in any case it is easier, as the grafts curl when cut, the perichondrium being in the concavity. They should overlap everywhere, and may well be doubled, as some slight recession always takes place, and those cases give the best final result which, at the end of the operation, show a slight boss. When the frontal or temporal regions are involved, it is well carefully to study the sound side before operating; it is then possible to restore almost exactly the symmetry of the forehead.

4. **Septic Peritonitis: Treatment by Cecostomy.**—In Nyulasy's series of cases, as soon as the opening into the cecum was made, the feces usually came out under high pressure, in one instance rising up in a stream over 8 iinches high. He suggests, therefore, that if the cecum had contained this fluid before it had been opened, we may reasonably assume that the fluid would have been forced along the colon to the anus. Since this had not happened, it seems likely that these feces had not yet reached the cecum, but were held back in the ileum, and that the opening of the cecum relieved the obstruction. He suggests, therefore, that the

efficacy of cecostomy may depend on a possible power to relax ileocecal spasm, and thereby release virulent feces pent up in the small intestines.

6. **Early Treatment of Gunshot Fractures of Thigh.**—The authors are convinced that the Thomas knee splint is the most suitable apparatus available for use in the transport of cases of fracture of the femur. The same splint can give excellent results as regards alinement and length in fractures in the middle third of the femur. Good alinement cannot be attained by the use of the Thomas splint in the case of fractures occurring in the lower third of the femur; but if the splint be modified by bending it at the knee joint level to form a skeleton double inclined plane, the results are good. Fractures in the upper third of the femur can generally be well treated in a Hodgen splint. Adhesive extension attachments are satisfactory for most cases, and are well suited to the conditions of active service. Transfixion of the bone is useful in special cases, and when the procedure is carried out at a distance from an infective focus. Cases reported demonstrate the importance of periodical prophylactic injections of antitetanic serum.

## British Medical Journal

*August 4, II, No. 2953*

16 *Investigation of Significance of Disorders and Diseases of Heart in Soldiers. T. C. Allbutt.—p. 139.
17 *Gunshot Injuries of Chest. J. R. Bradford.—p. 141.
18 Factors in Field Ambulance Work Which Help Work in Casualty Clearing Stations. K. M. Walker.—p. 146.
19 Dermatitis Due to Explosives Used in Air Raids. J. H. Sequeira. —p. 148.
20 *Statistics of Defective Vision Obtained at Recruiting Medical Board. C. F. Harford.—p. 149.
21 *Method of Supination by Plaster. P. J. Verrall.—p. 150.
22 Simple Means of Ascertaining if Sterilizing Hut Is Hot Enough to Destroy Lice and Nits in Clothing or Blankets. A. Bacot. —p. 151.

16. **Investigation of Significance of Disorders and Diseases of Heart in Soldiers.**—One main result of Allbutt's investigation is to strengthen the opinion which, before these researches were established, was gaining ground, namely, that "heart strain," a phrase a few years ago in common use and application, is a rare event. The fretful heart, known as the "soldier's heart," is not cardiac strain. For the term "soldier's heart" Allbutt suggests ponopalmosis, a compound word which means palpitation on effort. Heart strain, Allbutt says, is generally a result of some infection, is relatively infrequent, and does not constitute the bulk of the cases invalided from the army as "D. A. H." In "D. A. H." the form of the heart is unaltered and the dyspnea seems not to depend directly on the heart. A thrill must be very carefully placed and timed, for in many of these irritable hearts a systolic thrill can be felt; perhaps in most of them if some effort be made just before examination. It is short but often very distinct to the touch. It is not felt about the base of the heart, and is therefore not due to a slack aorta. How the thrill is generated it is not easy to say. Very often in these cases a systolic murmur at the apex is recorded, an alteration of the first sound, more like a prolongation of it with some change of quality than like a definite murmur of mitral regurgitation. Allbutt suggests that in these cases the papillary muscles and their chords may be a trifle slack, so that the mitral sheets shiver a little in the current, as a sail shivers when the boat gets near the wind. Such a quaver would be transmitted to the ventricular wall, and thence to the thoracic. In such a condition there might well be a minute, inconstant, and insignificant regurgitation also; though ordinarily in mitral regurgitation there is no thrill.

17. **Gunshot Injuries of Chest.**—Hemothorax is the most common rsult of a chest wound; both pneumohemothorax and pneumothorax are relatively rare, and in a series of 328 cases of gunshot wounds only eight cases of the former and four cases of the latter were observed by Bradford. In sterile hemothorax, Bradford says, if the amount of the bloody effusion is small, there is no need for any special active treatment; such cases do well, although their progress may sometimes be slow. If the effusion is at all large in amount—that is, the dulness reaching above the angle of the scapula—the fluid should be removed by aspiration about the end of the first week after the wound. In a few cases earlier aspiration may be required to relieve distress arising mechanically from the amount of fluid present. Aspiration with oxygen replacement is better than simple aspiration; all the fluid present in the chest can be removed at one sitting. Free drainage is required in all cases of infected hemothorax, and this should be provided as early as possible, as the organization of the deposit of lymph on the visceral pleura produces a great impediment to the rapid expansion of the lung after the removal of the fluid, and this organization proceeds rapidly in cases where delay in operating takes place. The inflammation in the pleural sac and the septic clots must be treated by the local application of some efficient antiseptic. If the cavity is treated by washing out, care must be taken to avoid arising the intrapleural pressure. Septic clots, often of considerable size, can be removed with success by this method. Care must be taken in selecting the site for excision of a portion of rib to provide really efficient drainage, and the fact that the diaphragm is abnormally high in these cases must be borne in mind, as otherwise the opening will be made too low down. In some instances the wound of entry or exit communicates more or less directly with the pleural cavity and fluid in variable quantity drains from it; this drainage is rarely satisfactory or sufficient, and such cases require a counter opening in a suitable situation to really drain the effusion.

21. **Method of Supination by Plaster.**—The plaster is applied over felt (previously stitched together around the limb) and consists of two parts. A few temporary stitches hold the two portions of felt together while the plaster is applied, and are then cut. The upper piece reaches from the middle of the arm to the middle of the forearm; the lower from the middle of the forearm to just above the heads of the metacarpal bones, a hole being left for the thumb to protrude. On either side of the interval between the two portions pieces of metal are incorporated in the plaster. These consist of metal strips ¾ inch wide and 3 inches long, one inch of which is turned up at a right angle and the other two inches notched to ensure firmer incorporation in the plaster, the notched corners being turned up to form spikes. One of these is fixed into the radial and another into the ulnar side of the lower part, and two other pieces are similarly inserted into the inner and outer aspects respectively of the upper part. When the plaster is firmly set (next day) pieces of rubber tubing are stretched round these two pairs of metal pieces and gradually tightened from day to day, supination being complete when the two pairs are opposite one another. If desired, pronation can be obtained by reversing the process. It is necessary to put extra felt padding over the head of the second metacarpal, over the lower end of the radius, and over the ulnar border of the hand. When supination is complete the arm should be kept in this position for at least three weeks to prevent relapse before massage is begun. This method is suited to cases of adhesions in the upper and lower radio-ulnar joints, fractures of the forearm where there is danger of cross union, and disability due to contracture of soft parts.

## Edinburgh Medical Journal

*August, XIX, No. 2*

23 Need of Future: Efficiency Based on Moral Responsibility. W. Russell.—p. 78.
24 Etiologic Classification of Deformities of Female Pelvis. D. B. Hart.—p. 82.
25 Nasal Neuroses, Regarded as Sensitizations of Respiratory Tract; Résumé of Recent Literature. J. S. Fraser.—p. 91.
26 Cases of Vascular Injury. F. C. Pybus.—p. 108.
27 Arteriovenous Aneurysm of External Iliac Artery. N. Maclay. —p. 112.

## Medical Journal of Australia, Sydney

*July 14, II, No. 2*

28 Occurrence of Fractures. J. G. Edwards.—p. 25.

*July 21, II, No. 3*

29 Early Operative Treatment of Chronic Discharge from Middle Ear. R. G. Brown.—p. 43.
30 Relationship of Opticians to Profession and to Public. J. L. Gibson.—p. 47.
31 Unusual Case of Occupation Neurosis. J. C. Verco.—p. 50.

## Tropical Medicine and Hygiene, London

*August 1, XX, No. 15*

32 *New Thrush Parasite. A. Pijper.—p. 169.
33 Tropical Diseases Met with in Balcanic and Adriatic Zones. (Continued). A. Castellani.—p. 170.

32. **New Thrush Parasite.**—Pijper cites the case of a child of four months, in very bad condition due to underfeeding and exposure to cold, exhibiting the usual symptoms of thrush, but for the color of the patches. These were distinctly not white or whitish, but yellowish. A whole patch was taken off (slight bleeding followed) and planted. Better care and alcoholic paintings soon restored the child to health. The cultures showed that the parasite causing this sore throat was the fungus known as *Monilia rugosa* Castellani.

## Archives des Maladies du Cœur, Paris

*June, X, No. 6, pp. 257-304*

34 *Device to Ensure Precision in Heart Tracings. C. Laubry and A. Mougeot.—p. 257.
35 *Aviator's Sickness. G. Ferry.—p. 275.
36 *Shrapnel Ball in Left Iliac Region Passes through Inferior Vena Cava to Right Auricle. C. Pezzi.—p. 285.

34. **Precision in Heart Tracings.**—Laubry and Mougeot give an illustrated description of the sliding gage attachment which records with mathematical accuracy the different phases of the heart action. They expatiate also on the points to be learned from this greater precision in the findings.

35. **Aviator's Sickness.**—Ferry has been studying on others and on himself the cardiovascular reactions in aviation. He here describes in detail the cardiovascular reactions observed in an aviator of 33 who had been discharged from the army on account of symptoms of Bright's disease. These had subsided under rest and dieting, all except the albuminuria. The findings in this case indicate that 1 gm. albumin is the extreme limit permissible, even in a young aviator, and only then when the kidneys seem to be behaving well otherwise. If the kidney functioning is defective, whatever the amount of albumin, the candidate should be rejected.

36. **Projectile in the Heart.**—Pezzi calls attention to a case recently reported by Ascoli in which a shrapnel ball entered the back in the iliac region and its course was traced by radioscopy along the vena cava and into the right auricle where it seems to be harmlessly sojourning. The symptoms at the time of the wound and while the projectile was in the vein were quite severe, but since it entered the heart there has been no appreciable disturbance. It has probably become coated with fibrin, and as it is tossed about in the blood stream pouring through the heart, it probably gets no chance to come in contact with the walls of the auricle, and the retrograde current as the valves close keeps it away from the valves likewise. In ten cases on record of a projectile in the heart, an attempt was made to extract the projectile. Four of the patients died, but the operation was a success in six cases. But even in these favorable cases there were threatening heart and pulmonary disturbances. Ascoli does not advise any operation in his case as the lungs are diseased and the general health poor. The case confirms the prevailing physiologic conceptions as to the mechanism of the action of the atrioventricular valves.

## Journal de Médecine de Bordeaux

*July, LXXXVIII, No. 8, pp. 145-168*

37 *Tardy Extraction of Projectiles in the Thorax and Pelvis. Charbonnel.—p. 147.
38 *Traumatism and Pleuropulmonary Tuberculosis. Carles and Charrier.—p. 155.
39 Technic for and Advantages of Intravenous Quinin Treatment of Malaria. R. Le Dentu.—p. 159.
40 What Has Been Done for Tuberculous Soldiers. E. Leuret.—p. 161.

37. **Extraction of Projectiles in the Thorax.**—Charbonnel has performed 128 operations to extract projectiles after the wound had healed. This includes thirty-four cases of a projectile deep in the thorax or in the region between a horizontal line passing through the fourth lumbar vertebra and a line connecting the lesser trochanters. He summarizes the details of each and the lessons learned from his experience.

38. **Traumatism and Tuberculosis of Pleura or Lung.**—Carles and Charrier state that in 104 cases in their service of war wounds of the chest, in only one instance a pleuropulmonary tuberculous process has developed for which the traumatism seemed to be responsible. The young man had been robust and exceptionally healthy; the first symptoms of tuberculosis developed about six weeks after a shell wound of the right lower chest and proved fatal in less than three months.

## Paris Médical

*July 21, VII, No. 29, pp. 61-76*

41 *Pleuropulmonary Tuberculosis and Military Service. C. Laubry and L. Marre.—p. 62.
42 *The Intestinal Preoccupations of the Aged. P. Merklen.—p. 66.
43 Horehound in Treatment of Bronchitis. H. Leclerc.—p. 69.
44 Improved Apparatus for Continuous Extension, Especially of the Hip Joint. Chabannas.—p. 71.

*July 28, No. 30, pp. 77-92*

45 *Features of Malaria Acquired in Macedonia. P. Carnot.—p. 78.
46 *Beneficent Secondary Pleurisy with Pulmonary Tuberculosis. C. Murard and H. Marotte.—p. 85.

41. **Pulmonary Tuberculosis and Military Service.**—In concluding their study of this subject, Laubry and Marre say that in dubious cases in which the man has been given leave of absence for the usual three months, he should go to the hospital for a week for thorough examination before his case is finally passed on. The greater their experience the more exceptional they find actual recuperation after a man has been sent back from the front on account of pleuropulmonary tuberculosis. But many of the men recuperate enough for the auxiliary service and can prove very useful as guards for prisoners, for bridges, and other light duty.

42. **The Intestinal Preoccupations of the Senile.**—Merklen comments on the way in which the senile become slaves to their bowel, convinced that they are constipated and applying all kinds of measures against the dreaded constipation. He warns the physician not to be misled by their statements and complaints. If the physician is duped by them, they use his statements and authority to back them up in their erroneous practices, and the vicious circle becomes more and more confirmed. A factor that frequently cooperates is their forgetfulness; they do not remember when they have been to stool and may honestly believe that days have elapsed since their last passage.

45. **Macedonia Malaria.**—Carnot says that the plasmodia found in the men returning with malaria from Macedonia are of the usual tropical and tertian types, but they seem to be peculiarly resistant to quinin. Some of the men and physicians returned from Macedonia still have their attacks or series of attacks every two or four weeks, notwithstanding that they have been taking quinin regularly for more than a year, some with great system and perseverance. Even by the intravenous route, the attacks are only postponed a little, not broken up completely, except the one attack in course, without warding off attacks later, sometimes very violent. Arsenobenzol is equally ineffectual so far as a permanent cure is involved, but this aids in building up the general health. A combination of these two drugs seems to be the best we can do at present, he says, giving them together or in turn. The spontaneous acquirement of immunity seems to be the only reliable means of finally exterminating the hematozoa, and our chief aim should be to favor these biologic reactions.

46. **Beneficent Secondary Pleurisy with Pulmonary Tuberculosis.**—Murard and Marotte report in detail three cases all showing the arrest and tendency to sclerosis of a progressive primary tuberculous lung process after an intercurrent pleurisy with a moderate effusion, left unmolested. In each the pleurisy came on with a sudden onset, the symptoms so stormy that the clinical pictures resembled those from a spontaneous pneumothorax. In a fourth case the effusion was evacuated and the symptoms became at once seriously aggravated, until the effusion had collected again. The secondary pleurisy in such cases is probably due to the bursting of some minute superficial tubercle, opening into the pleura and pouring into it a few tubercle bacilli, only enough

to start an immunization process from the serofibrinous effusion. Similar benefit has been observed from the pleurisy noticed in the course of treatment with artificial pneumothorax. In both, the effusion starts a kind of immunization process.

### Gazzetta degli Ospedali e delle Cliniche, Milan

*June 14, XXXVIII, No. 47, pp. 689-696*

47 *Hemorrhagic Spirochetosis among the Troops. P. D. Siccardi.—p. 691.

*June 17, No. 48, pp. 697-712*

48 *Bony New Growths Consecutive to Multiple and Repeated Contusions. A. Mori.—p. 697.

**47. Hemorrhagic Spirochetosis.**—Siccardi has already reported on 700 cases of an infectious cutaneous hemorrhagic syndrome among the troops in his division. One of the two types has certain features suggesting typhoid; the other developed only after frostbite, and resembled scurvy. In this latter group he encountered a few cases which were caused by the icterohemorrhagic spirochete described by Inada and Ito, and he was able to reproduce the disease in guinea-pigs. Even at the seventh generation it killed guinea-pigs in from three to twelve days. This spirochete is eliminated mainly in the urine, even after clinical recovery. The large rats common in the trenches eat human excreta, and they probably represent the intermediate host or at least the conveyors of the virus. The epidemic appearance in certain months of the year and the complete subsidence as winter comes on suggest a possible transmission to man by insects. This assumption is rendered more plausible by the fact that the intravenous is the elective route for infection.

**48. Bone Growths from Occupational Trauma.**—Mori insists that the tendons, periosteum, bursae and the bone itself are liable to react to multiple and repeated slight contusions with a new growth, just as the soft parts react with hard edema. In four cases here reported an actual bone growth developed, independent of the skeletal bone below. It could not be ascribed to any periostitic changes. It starts with the coagulum. Metaplasia follows and as connective tissue, cartilage and bone have a common embryonal origin, it is easy to understand how one may become transformed into the other.

### Policlinico, Rome

*July 22, XXIV, No. 30, pp. 925-948*

49 *Rolling the Head during Sleep. B. Masci.—p. 925.
50 The Enterococcus as Cause of Severe Intracranial Complications of Otitis and Mastoiditis; Three Cases. P. Caliceti and R. Vaglio.—p. 929.
51 *Emergency Treatment of Wounds of the Thorax and Lung. E. Morelli.—p. 930.
52 Suggestions for Improving the Organization of the Field Surgical Service. G. Bartolone.—p. 932.

**49. Rolling the Head from Side to Side During Sleep.**—Masci's patient is a young soldier who has been in the hospital for five months for treatment of frozen feet, complicated with a severe burn owing to loss of sensation in the feet. During this entire period he has had a habit of rolling his head from side to side during slumber, the head describing a complete half circle from shoulder to shoulder. The rhythm is almost as regular as a pendulum's swing, from seventy-five to eighty complete turns per minute. The man sleeps lightly but wakes refreshed, without headache or dizziness, and never cares to sleep during the day. No modification was observed under tonics or sedatives until he was given 2 gm. doses of chloral. Under the influence of the chloral he slept quietly, the head lying normally still. As this was only a palliative, Masci discontinued the chloral and the rolling movements began again as before. There are no cramps or contracture in any other muscles, and the man seems normal otherwise. He was not aware of his trouble until he heard the doctors discussing his case. He had taken a very active part in the war at the front from the beginning. The tendency to the movements probably exists during the waking hours also, but the inhibition exerted unconsciously by the will prevents its manifestation. Masci remarks that treatment would be undertaken with confidence if the movements occurred awake, but "how can psychotherapy and immobilization do any good when the trouble appears only when the man is unconscious in sleep?" Probably it will spontaneously subside when the strain of trench life is over.

**51. Wounds of the Chest.**—Morelli refers to the immediate emergency measures for wounds of the thorax, saying that the outcome depends on prompt clearing out of the wound and keeping up the intrathoracic pressure. The danger of infection from the air of a pneumothorax is less imminent than the danger from a hemothorax. His experience with hundreds of chest wounds has convinced him that a spontaneous pneumothorax is the most fortunate thing that can happen to a man wounded in the thorax. In order to maintain the pneumothorax it is usually necessary to close the opening into the chest, and he uses for the purpose a long, soft rubber bag that can be introduced between the lips of the wound. When inflated, it plugs the opening airtight. The shape of the bag with its inflating tube is somewhat like the outline of a small violin. He has them of different diameters to fit different sized openings, and sometimes more than one has to be used when the projectile tore its way out again. In one case the pressure within the thorax was 4 cm. water after these bags had been introduced and it rose later spontaneously to 12, showing the hermetic closure. The closure of the wound is experienced by the patient as a great relief. After danger of hemorrhage has passed, the wound can be closed by surgical measures.

### Revista de la Asociacion Medica Argentina, Buenos Aires

*June, XXVI, No. 151, pp. 595-965*

53 *Serums and Vaccines in Treatment of Puerperal Septicemia. J. A. Beruti.—p. 595; N. P. Costa.—p. 774.
54 *Radium Treatment in Gynecology. C. A. Castaño.—p. 613; E. A. Fox.—p. 643; E. Pouey.—p. 835.
55 *Management of Contracted Pelvis with Infected Uterus and Living Fetus J. A. Gabastou.—p. 666.
56 Roentgen Treatment in Gynecology. J. Iribarne.—p. 689.
57 *Sign of Advanced Extra-Uterine Pregnancy. J. C. Lascano.—p. 728.
58 Cesarean Section in Northern Argentina. J. C. Lascano.—p. 740.
59 Forceps Extraction Guided with One Hand. Loriente.—p. 756.
60 The Multiple Peritoneal Complications of Criminal Abortion. M. L. Perez.—p. 804.
61 *The Pediatrist in the Maternity. A. F. Puyol.—p. 846.
62 Advantages of Surgical Measures for Puerperal Septic Uteropelvic Thrombophlebitis. A. Turenne.—p. 853.

**53. Vaccine and Serum Treatment of Puerperal Septicemia.**—Beruti concludes from his own experience and the published data, that antistreptococcus serotherapy in puerperal septicemia generally fails. He declares further that the intravenous route is irrational, as also large doses and attempts to use antistreptococcus serum in prophylaxis. Better results have been realized with nonspecific serotherapy. Normal horse serum has given excellent results in the hands of Pouey and Turenne of Montevideo, among others. In one case the leukocytes rose from 4,500 to 25,000 under it, and in another case peritoneal septicemia retrogressed. Beruti has had a number of notable recoveries under intravenous injection of normal horse or beef serum, the single dose not over 20 c.c. It is his impression that the serum is more potent therapeutically when the animal has been previously bled. The effect is much the same as with the specific serums, but surpasses it. His conclusions as to specific vaccine therapy are that it has not sustained its promise. Vaccines made with other bacteria have proved unexpectedly effectual in the hands of some, especially in Argentina, with Enriquez, Kraus, Mazza and others, and Werner at Vienna has reported excellent results with a colon bacillus vaccine in puerperal fever. Beruti himself used an extract of colon bacilli, instead of a vaccine, applying it in a number of very serious cases of puerperal septicemia and with constantly unfavorable results. The intense reaction that followed the intravenous injection was unmistakably deleterious. In order to ascertain the physiologic bases for this heterotherapy, he experimented on dogs and rabbits. What he observed convinced him that there was something more involved in these formidable medicinal reactions than the mere action of albuminoids and colloids. But why they are so decidedly beneficial in some cases and so decidedly the reverse in others is still a mystery. It is like shaking a clock that has stopped; it may start it to going perfectly thereafter, or it may have

no effect or an injurious one. Costa regards the reaction to nonspecific vaccine as a kind of anaphylactic shock, liable to do harm.

54. **Radium Therapy in Gynecology.**—Castaño urges the founding of a radium institute at Buenos Aires like the one already in operation at Montevideo. He admits that radium is not a panacea, but pleads that it should be given a trial before proceeding to mutilating operations. For epithelioma it seems to be the only effectual treatment known to date. Fox presents the present status of radium therapy as gathered from the literature. The main reliance on it is as a prophylactic measure after resection of cancer. Pouey reports fifteen cases which confirm the lack of effectual action from radium on deep-lying cancer and its admirable action on superficial malignant disease.

55. **Management of Contracted Pelvis.**—Gabastou discusses the preferable procedure with an infected uterus and living fetus according to the various degrees of contracted pelvis.

57. **Sign of Advanced Extra-Uterine Pregnancy.**—Lascano calls attention to a peculiar sensation of elasticity in a certain area in the supposedly gravid uterus which he noted in three women. Each had borne other children and was supposed to be at about the sixth or last month of a new pregnancy. This area of soft, cyst-like elasticity seemed to be separate from the rest of the uterus, and it proved to be the placenta of an extra-uterine pregnancy. The placenta palpated through the wall of the uterus never is so soft and elastic as he found it in these three cases, and the discovery of such a cyst-like area justifies the assumption of extra-uterine development of the fetus. The special features of the three cases are described, with the necropsy or laparotomy findings.

61. **The Pediatrist in the Maternity.**—Puyol is chief of the pediatric service at the Maternity at Montevideo, and he expatiates on the great benefit of such work in connection with the lying-in department. As a rule all the attention is paid to the mother and the babe is apt to be overlooked to a certain extent unless there is a pediatrist on hand. He insists on the children being brought back for regular inspection and consultations, and he points with pride to the fact that during the year 1916, with 1,646 childbirths, thrush and ophthalmia were unknown, and artificial feeding was not required for even one infant.

## Semana Medica, Buenos Aires

*June 7, XXIV, No. 23, pp. 643-670*

63 Spontaneous Tumors in Wild Rats. M. Beatti.—p. 643.

*June 14, No. 24, pp. 671-726*

64 *Operative Treatment for Acquired Megacolon. G. B. Arana.—p. 671.
65 *Subcutaneous Injection of Oxygen in Treatment of Neuralgia. A. Cetrangolo.—p. 709.
66 Evolution of Obstetrics in Argentina. A. D'Alessandro.—p. 710.

64. **Colectomy for Megacolon.**—Arana gives an illustrated description of the preferable technic for colectomy with acquired megacolon, with details of thirteen cases. He insists that improved technic has reduced the gravity of the operation but that it should not be attempted with advanced age or serious lesions of internal organs, and a palliative operation should be the rule until the acute phase is past.

65. **Oxygen Treatment of Neuralgia.**—Cetrangolo reports a typical case to emphasize the benefits from subcutaneous injection of oxygen in treatment of sciatica and other forms of neuralgia, especially intercostal. The woman of 39 had complained for some time of neuralgia in the right arm, accompanying a tuberculous lesion in the right lung. The pains grew worse each time as the temperature rose. By exclusion he assumed that the neuralgia was the work of tuberculous toxins and injected oxygen into the subcutaneous tissue at the root of the arm, massaging afterward to spread the oxygen. By the next day all pain had disappeared and there has been no recurrence during the months since. This oxygen therapy has been applied to date mostly by Spanish, French and Argentine physicians, and they have reported good results with it in neuralgia and also in gangrene, weeping eczema, suppurations, anemia, tuberculosis and infections of gastro-intestinal origin, such as typhoid.

## Siglo Medico, Madrid

*July 21, LXIV, No. 3319, pp. 525-544*

67 *Radiotherapy of Tuberculous Glands. J. and S. Ratera.—p. 526.
68 *Nontuberculous Suppurative Processes in the Kidneys. S. Pascual. —p. 530. Commenced in No. 3318, p. 506.
69 *Vacuum Aspiration Extraction of Cataract in the Capsule. D. J. Wieden.—p. 533.
70 Experimental Study of Length of the Passage with a Bullet Wound. A. Lecha-Marzo.—p. 534.
71 Splenomegaly and Infantilism. F. J. Asua.—p. 535.

67. **Radiotherapy for Tuberculous Glands.**—Ratera has treated thirty patients with tuberculous glands by exposures to the Roentgen rays, and has been impressed by the prompt cure under this form of radiotherapy. He declares that it is so effectual that it can be relied on to differentiate ordinary tuberculous glands from Hodgkin's disease, as in his five cases of Hodgkin's disease not the slightest benefit was apparent. It even seemed in some of the cases as if the disease had been whipped up by the exposures.

68. **Present Status of Nontuberculous Suppurative Processes in the Kidneys.**—Pascual remarks that the diagnosis of suppuration in the kidney is easy when the pain in the lumbar region, fever and turbid urine occur during or following a pregnancy, influenza or typhoid. But there may be nothing to attract attention to the kidneys, merely slight fever with vague general symptoms suggesting rather gastro-intestinal trouble. In regard to the nature of the suppurative process, inoculation of guinea-pigs is the only reliable criterion. Nothing but catheterization of the ureters and analysis of the urine from each kidney separately will decide the treatment to be applied. In pyelonephritis or pyonephrosis without retention, with or outside of a pregnancy, general treatment should be given: restriction to a milk diet, diuretic drinks and drugs to combat infection in the urinary passages and intestines, and if the disturbances keep up, the pelvis should be rinsed out, as also when there is retention. All medical measures should be given a thorough trial before operating. When both kidneys are affected and there is much distention there is little hope from any measures, medical or surgical. When an operation is inevitable, he advises nephrectomy rather than nephrotomy as the latter is liable to entail an interminable fistula.

69. **Vacuum Aspiration Extraction of Cataract in the Capsule.**—Wieden remarks that the extraction in the capsule, according to the method of I. Barraquer, is most important progress in ocular surgery. With other technics more or less of the lens and parts of the capsule are left behind, entailing complications. Barraquer regards the cataract as a cyst with degenerated contents, which explains the virulence of post-operative iritis, and emphasizes the necessity for removing all the contents and the enclosing capsule. With the Smith forcible technic there is liable to be loss of vitreous. This is avoided with the Barraquer method, as pressure does not have to be applied. Iridectomy is rarely needed with it. The operation is reduced to the incision of the corneoconjunctival flap; after this the lens is drawn out by suction with a kind of cupping glass. Wieden relates that he recently was present when Barraquer extracted six cataracts at one session. Some were hard senile cataracts, other were soft, and in one case there had been dislocation of the lens into the anterior chamber. The extraction proceeded successfully in all, without iridectomy; the pupils were left normally centered and black. In some cases the eye had an anterior chamber within a few minutes. The extraction is complete in about three seconds, and it is most impressive to see the cataract slide out, clinging to the cupping instrument, merely from being gently sucked out. The cupping instrument fits over the anterior surface of the crystalline lens, through the pupil, without the slightest injury to the iris, and the cataract comes out with it when the instrument is gently withdrawn. With all other methods, extraction of the cataract in the capsule exposes to the danger of hernia of the vitreous, but Barraquer's method guarantees against this. He has applied it to date in 127 cases of all kinds of cataract and has never had any operative mishaps with it. In conclusion, Wieden prophesies that this new Spanish method is destined to supersede Smith's Indian method entirely. (It was described in THE JOURNAL, 1917, **68,** 1789.)

**Russkiy Vrach, Petrograd**

*XVI, No. 12, pp. 265-288*

72 Sulphur Mineral Waters: Action of Hydrogen Sulphid on the Organism. B. I. Slovtsoff.—p. 265.
73 *Typhus in Guinea-Pigs. N. T. Gamalieya.—p. 270.
74 Organization of the Hospital Trains. N. N. Anitchkoff.—p. 271.
75 *Ether-Oil General Anesthesia by Way of the Rectum. T. I. Protopopoff.—p. 275; N. V. Markoff.—p. 278; V. A. Yakovenko. —p. 283; Y. Y. Kramarenko.—p. 284; V. A. Meshtchersky. —p. 285.

73. **Further Light on Typhus.**—Gamalieya describes the infection of guinea-pigs with typhus, and calls attention to the fact that the blood of the infected guinea-pigs proved infectious during the very beginning of the infection. If this is the fact also in man, the persons infected would be dangerous from the point of view of infecting others, even when they were apparently still entirely well. Another point to which attention is called is the difference between the behavior of the typhus germ and other invisible microbes (smallpox and rabies). The latter are not damaged by glycerin, and glycerin is often used to clear their vaccines of foreign microbes. But the typhus microbe is extremely susceptible to the action of glycerin. Typhus organs subjected to the action of 80, 50 or even 30 per cent. glycerin lose their infectious power after twenty-four hours. Even with 20 per cent. glycerin, although the organs are not entirely sterilized, yet they are only weakly infectious thereafter. This sterilizing action of glycerin on the typhus microbe is so pronounced, it is said, "it justifies the administration of glycerin internally in treatment of typhus, especially as we know it is harmless." Another peculiarity of the typhus microbe is its susceptibility to low temperatures. Organs exposed to freezing temperatures lose their infecting power. This fact intimates that winter temperatures will eradicate the infection in clothing, etc. Moreover, it indicates a special fragility of the typhus germ, as not only the other invisible bacteria but also many other ordinary bacteria bear without injury even very low temperatures. The facts here related seem to suggest, he adds, that if typhus is transmitted exclusively by the bite of the louse, it is because the microbe is too frail to be conveyed in any other way.

75. **Ether-Oil Anesthesia by Way of the Rectum.**—Protopopoff concludes from his experience with this rectal method of general anesthesia in fifty-six cases that it has a number of advantages in certain cases, especially for operations on the head and neck, and when the one to give the anesthetic is inexperienced. The simplicity and ease of the rectal technic are remarkable, while with it, general anesthesia for one, two or three hours can be counted on. He declares that it is safer than any other method for general anesthesia, and should be selected when it is desirable to keep the patient long under the influence of the anesthetic. He found the narcosis and the relaxation of the muscles more complete than with any other technic. The method also offers peculiar advantages when an emergency operation has to be done at night with poor illumination. A minor advantage is that the patient is relieved from the dread of the mask. He makes a point of rinsing all the ether-oil mixture out of the intestine as soon as the desired effect has been realized. Any further absorption of the drug is unnecessary and can do only harm. He found it better to rinse out the bowel with only a little of the soapsuds at a time, from two to four cupfuls, letting this run out again before pouring in more, but he uses a total of four or six pitcherfuls for the rinsing, or until the water comes away without the slightest odor of ether. The patient sleeps on tranquilly just the same after the ether has been rinsed out. He goes under in thirty or forty minutes as a rule, but often in ten or fifteen minutes; only rarely an hour may elapse before the sleep is profound. It lasts always an hour, usually for two or three hours and sometimes for five or six. In his fifty-six cases he never saw any signs of the pulse growing weaker or the respiration flagging. Two of the fifty-six patients died, but the details he gives of the cases show that other causes were responsible. He used equal parts by weight of ether and oil, allowing 50 c.c. of ether for each *pood* of the body weight. (A pood is 36.11 avoirdupois pounds.) This proportion is for a well nourished person of sound constitution. For the debilitated, he reduced the amount to 40 or 30 c.c. as also when the operation was to be on the legs or pelvis, as the effect of the ether given in the rectum is naturally most pronounced in the vicinity of the rectum and below. There was vomiting in 10 or 15 per cent. of the cases and hiccup in 5 or 10 per cent.

75. **Ether-Oil Anesthesia.**—In Markoff's thirty cases, two men with far advanced spesis from war wounds died, but the anesthetic could not be incriminated. In his experience the heart action was occasionally somewhat depressed, the pulse growing faster and weaker, sometimes increasing by twenty beats to the minute. He used a total of 185 gm. ether to 100 gm. oil; attempts to get along with less always failed. The quicker and stronger the odor of ether appeared in the breath, the better the anesthesia. It came on profound in from three to twenty-eight minutes, the average interval being seventeen minutes, and it lasted on an average for four hours. There was early vomiting in two cases and on waking in seven, but other factors may have been responsible as many of the operations were on the head. A phase of agitation was noted in about half the patients before they yielded to the anesthetic.

75. **Ether-Oil Anesthesia.**—Yakovenko reports twenty-two cases. He used 1 gm. each of ether and of sunflower oil for each nine-tenths of a pound of body weight. The pulse was full and slow, the resporation regular and deep, as a rule, but he reports one case in which the respiration center evidently became paralyzed, and artificial respiration was required for a full half hour. Another complication liable is the dropping back of the tongue, which compels close surveillance until the patient rouses, which may not be for three or five hours. As the patient dropped off, there was liable to be vomiting or hiccup, but none occurred during his operations.

75. **Ether-Oil Anesthesia.**—In this fourth article in this symposium, Kramarenko cites twelve Russian authors who have reported a total of 378 cases in which ether has been administered by the rectum. He says that all expatiate on the advantages of the technic and scarcely mention unfavorable by-effects, but one other surgeon has reported a fatal case. The dosage is still undetermined; some use three parts ether to one part oil, while others give more oil, down to a mixture of only 0.9 parts ether to one of oil. In eighteen of the cases more ether had to be given by inhalation to get the patient under. Other drawbacks are the impossibility of controlling the narcosis and the varying susceptibility of different patients to the ether. He further reports in detail a case in which the operation had to be interrupted as there was such profuse secretion from the bronchi, threatening suffocation, until it was arrested by subcutaneous injection of atropin. All writers on the subject advise and give a preliminary injection of morphin, but he insists that it should be accompanied by injection of atropin. In a second case, which he reports in detail, respiration stopped, the pulse ran up from 100 to 140, and the operation had to be suspended while artificial respiration was applied and continued for an hour and a half. The rectum was rinsed clean in the meanwhile. When natural respiration was restored, the operation was then successfully completed.

75. **Death Following Ether-Oil Anesthesia by the Rectum.**—Meshtchersky's patient was a young soldier with a fibromyxosarcoma in one side of the nose, which was removed without difficulty under the rectal anesthesia, and the patient was returned to his bed. About five hours later, while still sleeping profoundly, the pulse began to flag and in spite of all measures continued to drop, the man succumbing three hours later. Necropsy disclosed that the sarcoma extended back into the ethmoidal sinus, but nothing was found to explain the fatality. No mention is made of the suprarenals, but the other organs seemed approximately normal. The nurses and intern had been watching over the case with special care when the collapse developed. Notwithstanding the stimulants and other measures applied, it proved impossible to restore the patient to consciousness, nothing having any effect in arresting the cumulative action of the ether. The dose had been 150 gm. ether to 100 gm. oil of sesame,

and after the operation had been concluded the rectum was drained, large amounts of the oil mixture coming away. Meshtchersky adds that notwithstanding the seriousness of this mishap, the hospital has not given up the use of this extremely convenient method of anesthetization, especially for operations on head and neck, but the dose of ether has been reduced to 100 gm. If more is found to be needed, it is given by inhalation. Each of the five writers quotes extensively from Gwathmey. A description of his technic was given in THE JOURNAL, Dec. 10, 1913, p. 2274.

### Nederlandsch Tijdschrift voor Geneeskunde, Amsterdam

*June 16, I, No. 24, pp. 1923-1998*

76 *Echinococcus Disease of the Brain. J. T. Peters.—p. 1927.
77 White Bread or Whole Grain Bread. E. C. van Leersum and J. Munk.—p. 1942.
78 Unilateral Paresis of Certain Cranial Nerves after Traumatism. H. Bolten.—p. 1946.
79 Chalk Cures Warts. A. B. J. Wong Lun Hing.—p. 1950.
80 Beriberi and Vitamins. J. de Groot.—p. 1952.
81 Medical Impressions of America. C. W. F. Winckel.—p. 1975. Continuation.

76. **Echinococcus of the Brain.**—Peters cites statistics to show that the brain is affected once to the liver's twelve times, as a rule, but in the sixty-three operative cases in the last five years in the Netherlands, there was no case of brain echinococcus disease. He recently encountered a case as a necropsy surprise, and urges the application of the serum sediment test with hydatid fluid (Ghedini-Weinberg) in every case of suspected brain tumor, applying the test to the cerebrospinal fluid. A history of having much to do with dogs and living in a region where echinococcus disease is known to be prevalent, may also aid in differentiation.

### Svenska Läkaresällskapets Handlingar, Stockholm

*June 30, XLIII, No. 2, pp. 345-504*

82 *Cancer of the Prostate. B. Floderus.—p. 345.
83 *Recklinghausen Tumor of Wolffian Body. (Urnjurens utbredning och återbildning). H. Forssner.—p. 389.
84 *Fractures Below the Knee. A. Troell.—p. 439.

82. **Cancer of the Prostate.**—Floderus insists that cancer of the prostate should be suspected whenever an elderly man complains of disturbance in urination or pains in the lower abdomen, or sciatica, and also whenever the prostate is enlarged. He is convinced that it is much more frequent than generally recognized; both cancer and adenoma may exist side by side. He has encountered ten cases of this combination; at first, and possibly for years, the clinical picture may be merely that of hypertrophied prostate. In one such case cystostomy was done nine months before death which occurred from pyelonephritis. Necropsy disclosed cancer tissue in the prostate with metastasis in some of the pelvic glands. The prostate was regularly enlarged and of an even, elastic, soft consistency, without perforation of the capsule at any point. In another case the prostate trouble was of nine years' standing; four years before death its cancerous nature had been surmised from involvement of the seminal vesicles and inguinal glands.

In Floderus' 800 cases of manifest neoplasm in the prostate, there were eighty malignant cases, that is, in 10 per cent. The ages ranged from 50 to 85. In his cases the seminal vesicles were involved twice as often as has been reported in the older statistics; Young, alone, has encountered this complication in 80 per cent. Floderus found cancer nodules in the bladder at five out of eleven necropsies. If the ureter mouth is compressed, hydronephrosis may develop comparatively early. Metastasis occurs generally by way of the blood or urine, as the prostate capsule resists so tenaciously the encroaching cancer. Metastasis in bones is more common, judging from his experience, than in other tissues. The liver, lungs and pleura are the organs most frequently affected; next in order come the peritoneum, dura mater, kidneys, suprarenals and pancreas. Quite exceptionally metastasis has occurred in intestines, heart, brain, spleen, thyroid, the eye or bronchial mucosa. Secondary cancer in the prostate is known after cancer of the rectum, bladder and seminal vesicles. Palpation of the prostate through the rectum should never be omitted when the prostate is supposed to be enlarged. Before attempting any operation on a cancerous prostate, the bones should be examined with the Roentgen rays to exclude metastasis. The Bottini method of galvanocauterization of the prostate has given great relief in some cases known to be absolutely inoperable. Prostatectomy is most promising in the dubious, still incipient cases, but it has ensured a permanent cure in some fully manifest cases. Transvesical enucleation seems the best technic in the early cases, especially when there is much enlargement of the prostate. The typical perineal prostatectomy makes more demands on the patient, but it can be adapted better to the conditions encountered. In the more advanced cases, Young's operation or sacral prostatectomy should be considered. With inoperable cancer of the prostate, a palliative perineal prostatectomy is better than transvesical, but it should be supplemented by radium treatment. He pleads for the more general use of radium with cancer of the prostate both after operations and in the inoperable cases. The clinical course ranged from two and a half months to eleven years in his series. In the eight cases in which it was over five years, the primary disturbances were evidently due to adenomatous enlargement. More than with cancer in any other organ, he declares, the patient's fate depends on an early diagnosis. The prostate sometimes enlarges more rapidly than with simple hypertrophy, while in some cases the prostate scarcely enlarges at all. Sometimes the prostate may be the seat of simple congestion; in one such case the acute nonsuppurative prostatitis caused great increase in size, but all subsided under bed rest, laxatives, catheterization and massage of the prostate. The resistance of the capsule is greater at the lower pole so that as the cancer develops it is upward, forming a rounded tumor projecting into the bladder. As the posterior commissure increases in size, the median sulcus becomes partially or entirely smoothed out. This is a characteristic finding when the prostate is palpated through the rectum over a metal sound in the bladder. With simple hypertrophy the reverse occurs; the median sulcus is exaggerated. The cancerous prostate is liable to lose its sharp outlines and blend more with the surrounding tissues, or with some part protruding, and it is liable to be fastened to the wall of the pelvis. Any local tenderness in the glands in the vicinity may prove instructive. He applied epicystostomy in twenty-two cases and with invariably good results; some of the patients survived for more than fourteen months. It requires only a few minutes, and the incision after the introduction of the retention catheter may close up spontaneously. He has had no recurrence in any of his fifty cases in which the hypertrophied prostate was enucleated through the bladder (four deaths). In his three cases of a palliative perineal prostatectomy, the pains were relieved, micturition facilitated and the patients survived for eleven, six and one month. This intervention relieved the pelvic nerves from the pressure of the cancerous masses, and the benefit was marked. It also avoids the depressing influence of the fistula into the bladder so that he commends it as the best palliative measure when the patient is able to stand it and severe and radiating pains demand relief. Radium treatment through the incision should follow.

83. **Evolution and Retrogression of the Wolffian Body.**—Forssner gives three plates to show the findings in his research on embryos only 15 or 20 mm. long, and also nineteen illustrations in the text tracing the development of the wolffian body in the growing fetus. He compares the published data with his own findings, discussing in particular the so-called Recklinghausen tumors.

84. **Fracture of the Leg.**—This comprehensive study of 114 cases of fracture below the knee is accompanied by 137 excellent roentgenograms and a bibliography of 176 titles. The details of each case are given at the time of treatment and from one to four years later. The leg could be used in one or two months with simple fracture of the fibula alone, but four months were required for an abduction fracture and bimalleolar fracture; about six months for fracture of the shaft of the tibia, and fifteen months for fracture of the tibia condyles. Good anatomic healing was realized in 98 per cent. and good functional healing in 93.5 per cent. A plaster cast was applied in all but about 5 per cent.